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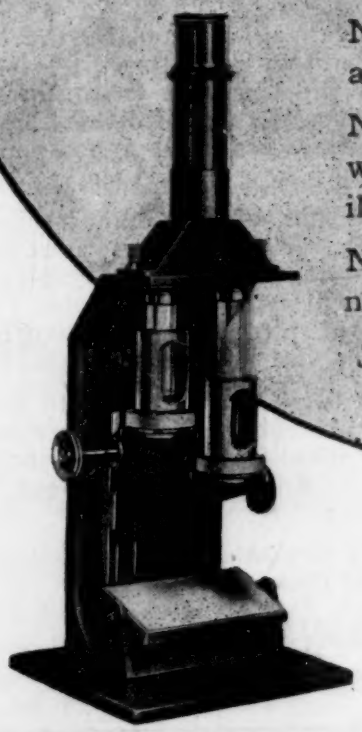

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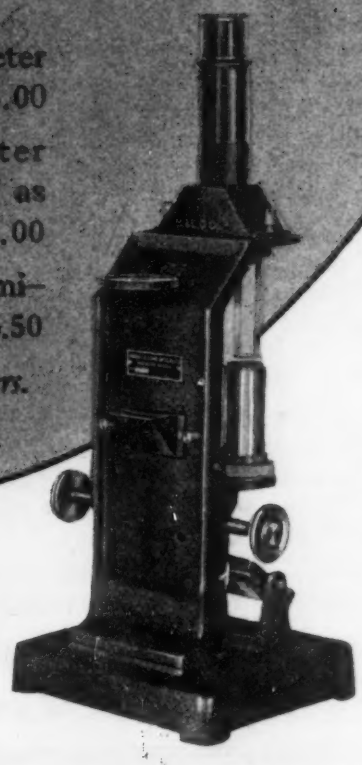

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ENTOMOLOGY[1]

CONSERVATISM of thought is justified up to a certain limit. Beyond that limit it is harmful. And it is just the same in everything. Conservatism in medicine has delayed the adoption of many useful ideas, but at the same time it has prevented the general adoption of many foolish ideas. Conservatism in education is perhaps the greatest stumbling-block to progress. Science has had hard work in its efforts to establish itself in educational curricula. Granting that it is now so established, conservatism still plays a most important part in the determination of the relative values of the scientific subjects taught. And in each science, conservatism—custom—still insists that certain aspects shall be stressed and certain others slighted.

Thus it is in zoology. In the teaching of this subject, since it began to be taught in the colleges and universities, entomology, by far the most important part of this science, has been slighted. In terming entomology the most important part of zoology, I do not wish to underestimate the very great value of those zoological studies that relate to how we as animals ourselves came to be; but to the dominant place that the class Insecta holds in the whole animal kingdom.

I see the time coming, however—perhaps it is almost here—when the full importance of entomology will be realized and when those educational institutions which long ago uncloistered themselves from the dominance of the dead languages and higher mathematics will still further broaden their teaching to rank entomology as a study of prime importance. Many things encourage me in this conclusion. A striking phrase has recently come to my attention. It was written by a professor of zoology in one of the most important universities in the United States—a man of broad training, a man of the present dominant school in zoological instruction. It reads as follows:

> In time this may become the age of man, the most highly developed mentally of the vertebrates, but at present he is only beginning to dispute the ascendancy Arthropod series.[2]

In these words Dr. Allee has very cleverly put a rapidly growing idea and one which for all these years

[1] Presidential address, Fourth International Congress of Entomology, held at Ithaca, N. Y., August 12–18.

[2] W. C. Allee, "The Evolution of the Invertebrates," Chicago, 1926.

has been unappreciated and never quite so well formulated. It is a startling thought to egotistical humanity that this is not the age of man; it is the age of insects; that man is a newcomer; that he is as yet an experiment, and that the same may be said of his immediate and in fact of his very remote ancestors—of the whole vertebrate series.

And why, with all this coming to be more generally realized, even with the teachers (Dr. Allee is associate professor of zoology in the University of Chicago), is there not a teaching reform—why is not entomology given a vastly greater importance in the leading educational institutions? This question has been asked insistently in Germany recently by Horn, Reh and others, and in fact it has been asked by Walther Horn ever since 1912. One answer may be put in the form of a question: Where are the teachers? Teachers must be taught before they can become teachers. And those teachers that come from the great zoological laboratories can teach little but what they have been taught, and they have not been taught entomology.

Even those who admit the very great importance of the subject, if they have looked into the matter at all, must be amazed by the enormous field of entomology—it is a whole world of its own. After a long life spent largely in its study, I find myself, for example, vastly more ignorant than I thought I was forty or even fifty years ago. Perhaps a more or less dim realization of the tremendous scope of entomology has deterred some competent workers.

I can imagine the predicament in which my English friend, Dr. George H. Carpenter, found himself when he was asked recently by Professor J. Arthur Thomson to write a book on the biology of insects, to appear in a series of which the other volumes already published had such titles as "The Biology of Birds," "The Biology of Mammals," "The Biology of Spiders." Carpenter did the book, and it is a remarkably good book; but he was apparently limited to five hundred pages and had to state apologetically in his preface that he was obliged to omit many subjects. As a matter of fact the volume contains fourteen chapters. A book of equal size (500 pages) could have been written under each of these chapter headings; and even then, I am sure, my conscientious friend would have had the feeling that he had hardly done justice to the subject.

It will probably occur to you that it is not necessary to tell these things to an international congress of entomologists. But I contend, on the other hand, that it is the duty of the president of such a congress to appreciate most fully, not only the honor that has been paid to him in his selection for the important office, but also the importance of the congress and its deliberations, and to formulate this importance in the best phrases at his command. In fact, this has already been done in an authoritative way by Professor Lameere in his admirably sound and broad address as president of the first of these entomological congresses at Brussels in 1909. He showed clearly the ample reasons why the international congresses of zoology did not satisfy the entomologists and why they could not satisfy them. Zoologists, strictly so called, he said, are usually strangers to entomology and their preoccupations are usually entirely different from those of the entomologists. Of course, he was speaking largely of Europeans, but what he said holds well for the rest of the world. The professors of zoology and their assistants and students are very rarely indeed entomologists. He makes the interesting statement that if you put these men on the seashore they are entirely in their element and can discuss at length the animals found there; but take them into your garden, and they will tell you that the insects existing there in very great numbers are almost entirely unknown to them.

I used to wonder in this country why the teacher of zoology, at an inland institution a thousand miles from the seaboard, should insist that his laboratory students should devote themselves for hours upon hours to the study of pickled sea-urchins or something of that kind when they were surrounded by instantly available living material in the shape of Insecta with which many important life problems could be studied. I quite agree with Lameere in his statement that the entomologists are almost as distinct from the zoologists as the zoologists are from the botanists and that they have accumulated an amount of science at least equal to these other groups. I further agree with him, and very heartily, in the statement that, whereas no one thinks of disputing the separation of the biologists into zoologists and botanists, there will be great advantages in establishing three categories, giving entomology an importance at least equal to that of botany or to the rest of zoology.

Having made these statements, I have relieved my mind for the moment on a subject which must be advanced strenuously at every opportunity if entomology is to gain the recognition it deserves.

The three presidential addresses that have been given before the three international entomological congresses have differed widely in character, and yet each one was admirable in its way. Professor Poulton at Oxford after a delightful introductory talk in which he spoke especially of Oxford, the Hope collection of insects, and of Westwood and Henslow and Huxley, devoted the main part of his address to the subject of specific change in relation to geographic distribution and to the organic environment, basing his discussion largely upon a series of *Papilio dar-*

danus, a subject of broad biological interest which, although the illustration was drawn from entomology, applied to principles extending through all of zoology and of botany as well.

Three years ago, at Zurich, Professor von Schulthess adopted still another plan. Very appropriately, he spoke of the long postponement of the congress from 1912 to 1925 and of the World War which interrupted the proposed third congress at Vienna in 1915 and put off all congresses for many years. He then spoke of the city of Zurich and of the historical development of entomology in Switzerland from the time of the publication of Sulzer's work in 1761 (fourteen years before Fabricius' first publication). Doubtless this third president, facing the long Zurich program, deemed it best measurably to efface his personality by shortening his remarks. It was a matter of regret for those of us who were present that he did not speak at greater length and give us some of the big ideas he has gained in a lifetime of work. His known standing and his impressive and delightful personality made us all wish to hear more from him, but perhaps his decision was the wisest, and the present speaker is much inclined to follow his example.

It is not needed that I should speak of American entomology. Most of us here are Americans. Those who come from other countries are men of wide reading and know of the sound work done here by an older generation, including Leconte, Horn, Scudder and Packard, and they know of the rather remarkable developments of economic entomology in the United States. But we are meeting in a university which was one of the first great institutions of learning to teach entomology as a distinct subject and to give it a measure of its appropriate rank. In this country at least, Cornell University will always be remembered by entomologists for this fact. And the man who, from the very start in 1874, conducted this invaluable teaching work, J. H. Comstock, lives here. America is so young that few shrines have come into popular recognition. There is one at Mount Vernon, the home of Washington; and there is the memorial in Washington to the great emancipator, Abraham Lincoln. The study of entomology seems a very small thing when we compare it to the causes represented by these two of our national heroes, but who shall say that in the future, when the vital importance of insects as affecting the well-being of humanity shall have become fully realized, this spot shall not become in a way a shrine where entomologists will gather in token of their respect to the first great teacher of entomology in America?

Very possibly you expect that the present speaker will touch upon the subject of economic entomology, a branch of our science with which he has been occupied for many years. The great support that has been given to entomological work with the practical end in view, perhaps notably in the United States, but with rapidly increasing strength in other countries, has not only encouraged the development of many strong workers who have brought about highly valuable results, but it has shown these workers in a very forceful way the basic value of the labors of those ardent entomologists who have been carried away by the fascinating scientific interest of other aspects of the science. It is in this way that more and more support is being given to work in entomology as a whole. It has had its effect upon college laboratories, upon museums and upon entomologists everywhere. The science through all its innumerable ramifications is acquiring a solidarity which means very much for the future—for the broadest recognition of its importance.

And so the members of section 5 (applied entomology) will continue to look upon the eminent members of sections 1, 2, 3 and 4 (morphology, anatomy and physiology; systematics and geographical distribution; nomenclature and bibliography; biology and evolution) with a deep respect, perhaps tinged with awe. The members of these sections, dealing as they do with "pure" science, will, I trust, look to the section-5 men as useful members of the congress who perhaps more than the others are helping to reform the old ideas of entomology and are bringing public appreciation and public funds to its support.

To those of you who come from the older countries for the first time we bid especial welcome; and we trust that you will return with a good opinion of us. We have been accused of self-consciousness; but we are young, and all young people are self-conscious. We have been accused of pride of achievement; but all young people who have a well-founded pride are very frank in expressing it. Our faults, then, are the faults of youth; and our accomplishments are those of ambitious, energetic youth, tempered and guided by the learning, experience and culture of the older countries.

L. O. HOWARD

UNVERIFIED GEOGRAPHIC RANGES

THE European conception of American geography has been a perennial source of humor to Americans, just as some American idiosyncrasies often supply amusement for the European. When, for instance, a correspondent in Leningrad asks me to "run out to Saskatchewan," where Bourgeau once collected an interesting plant, and secure for him living material, or when an English botanist requests for comparison growing specimens freshly collected for him in northern Newfoundland and western Alaska, we naturally

smile, for the latter areas are about four thousand miles (6,400 km) apart and without first-rate means of communication. To secure fresh specimens simultaneously from both regions would be equivalent to collecting simultaneously in Iceland and Nova Zembla or in Portugal and Ceylon. Or, again, when a continental botanist refers to "Newfoundland, an island in the harbor of Ottawa"[1] (geographically, though not politically, equivalent to speaking of Ireland as in the harbor of Berlin or Denmark as in the harbor of Moscow) and another cites a plant collected near Philadelphia (with a population exceeding two million) as coming from near "the village of Philadelphia,"[2] we are naturally grateful for these unconscious bits of humor.

If, however, we are looking for such innocent sources of entertainment, nothing excels Béguinot and Belosersky's *Revisione Monografica del Genere Apocynum* (1913). One can not help wondering if the authors ever attempted to find an atlas of North America or if the labels so erroneously copied really could have meant anything to them. "Late" Winnipeg, "Keweenaco" or "Keweenaio" Co., Michigan, "Penn Jan, Jates Co.," or "Perm Van," New York (for Penn Yan, Yates Co.), "Reichmond," Virginia, "Baltimora" (Biltmore), North Carolina, "Odui" (Odin), Illinois, and "Yonkeis" or "Jonkes," New York, are regularly cited and hundreds (perhaps thousands) of other localities not decipherable without the original label: "Mt. Halyoxe south Hadley" (Mt. Holyoke, South Hadley), "Steeping water" (Weeping Water), Nebraska, "Artistis Gleen" (Artist's Glen), "Dear Lake, lower Arron Lake" (Deer L., Lower Arrow L.), "Bumed timber area, Cherlum Lake" (Burned timber, Chelan L.), "*Jakina Region;* Wenatchu" (*Yakima Region;* Wenatchee), "Maryland.—Ma grunder" (Magruder), "Massachussets.—Hasland, Sh. Melton" (Highland St., Milton), "Big camac praine" (Big Camass Prairie), Idaho, "Drycapsa, Bridgeport" (Dry copses), "Deer Rim" (Deer Run), Colorado, "Jassagara" (Tessajara) Hot Springs; and, best of all, "Lake Corn d'Alume" (L. Coeur d'Alene) and "N. Messico:—Wring fired rauch" (New Mexico:—Wingfields Ranch). Not only does one surmise that Béguinot and Belosersky did not consult a good atlas; it is equally evident that they copied American labels (mostly clearly printed) without the aid of an English dictionary. It is certainly doubtful if they intended to rival *Jabberwocky* with their "Artistis Gleen," "Bumed timber," "camac praine" and "Wring fired rauch" or by such new coinages as "spreading slong-bank," "Grawelly soil" and "oorth of Salt Lake City." And who can interpret this English said to accompany a specimen collected at Seneca Lake, New York: "an coast skow of Semea Lake"?

My student, Mr. Robert E. Woodson, Jr., assures me that since he discovered this book he has regularly partaken of it when tired or in need of relaxation and that after two years of use he still finds fresh stimulus from its perusal! The great English student of the sedges, the late Charles Baron Clarke, writing from India and in an apologetic mood, said: "All papers, at least of a systematic kind, prepared in Asia, Africa, or America, must be, as literary work, very poor performances in the eyes of botanists in the herbaria of London, Paris, and Geneva."[3] It is beyond dispute that in the field of humorous literature no American botanist has yet equaled that above cited.

It is not of such naïve slips, however, that I specially wish to write. My concern, perhaps becoming intensified as its sources multiply, is with more serious geographic errors of fact which are altogether too common and which are due partly to ignorance, partly to failure to verify each doubtful point, but chiefly to indifference or inertia. Some of these errors, although quite inexcusable, leave a sufficient core of truth for us to make out what is meant. To this relatively harmless group belong the following: "Etats-Unis: Rogers' Pass, Selkirch Mts. . . . (Miss E. M. Farr),"[4] published by the organizer and for years the permanent secretary of l'Académie International de Géographie Botanique; and "Sable Island, Canada, U. States,"[5] perpetrated by an Englishman, apparently heedless of the international complication involved. Comparable with these cases, because not necessarily leading to complete misunderstanding, are the helter-skelter citations of localities, with states and towns treated as coordinate, so frequent in European publications and, unfortunately, in some American: such, for example, as "Süd-Carolina, Georgien, New Orleans, New Jersey, Louisiana; Virginia, Florida."[6] If we should cite a European range as England, France, Naples, Scotland, Italy, Ireland, Spain, we should expect to be accused of lacking geographic sense. And sometimes we certainly fail to display it, for, as already intimated, it is not difficult to find American systematic botanists who juggle geographic citations; and when an

[1] This gem was read about twenty years ago, but its exact source unfortunately forgotten.

[2] "in loco humido propre villam Philadelphia"—Buchenau, Monographia Juncacaerum, 378 (1890).

[3] C. B. Clarke, *Jour.* Linn. Soc. Bot., xxi, 2 (1884).

[4] Léveillé in Fedde, Repertorium, v, 8 (1908), meaning British Columbia: Rogers Pass, Selkirk Mts., etc.

[5] A. Bennett in Fryer and Bennett, "Potamogetons of the British Isles," 85 (1915).

[6] Ruhland in Engler, "Das Pflanzenreich," iv^{30}, 34 (1903).

American monographer cites specimens from Lake Mistassini (emptying into Hudson Bay) and Ungava River (draining into Hudson Strait) as coming from Hochelaga County, Quebec (Montreal and vicinity), or extends a range southward into Lower California on the basis of collections from the Sierra Nevada Mountains and from the shade of the Big Trees, *Sequoia gigantea,* it becomes evident that as a people we can not safely throw stones at our transatlantic confrères.

We systematic botanists (and some other botanists are not above reproach) can not call our work satisfactory until, as a group, we make greater effort to have the ranges fit the facts. In my early days of botanizing I distributed with full printed labels a series of exsiccatae from Aroostook County, Maine. One sterile plant, collected at St. Francis, Maine (No. 45), was erroneously determined and distributed as *Myriophyllum ambiguum* Nutt. (*M. humile* Morong), but fruiting plants (No. 44) from the same locality show it to be *M. verticillatum,* var. *pectinatum* Wallr. *M. humile* (*M. ambiguum*) is a species of decidedly limited area, on the northern Atlantic coastal plain and adjacent regions, the representation in the Gray Herbarium showing clearly identifiable material only from the Atlantic seaboard—Nova Scotia and Maine to New Jersey and eastern Pennsylvania, with sterile specimens perhaps belonging to it from slightly farther south. Nevertheless, Schindler,[7] having before him a specimen wrongly identified as *M. humile* and accompanied by a printed label with the full-face heading **Maine Flora, Aroostook Co.**, seized upon the locality printed below, ST. FRANCIS, and in "Das Pflanzenreich" at once extended the supposed range from the Atlantic to the Pacific slope, citing this specimen as coming from San Francisco!

One of the pioneer botanical explorers of the White Mountains of New Hampshire was William Oakes, whose memory is preserved by Oakes Gulf. One of the plants distributed broadcast by him was a tiny *Euphrasia,* with a densely capitate inflorescence and chocolate-purple corollas; and many years after the death of its discoverer, the tiny alpine *Euphrasia* won recognition as *E. Oakesii* Wettstein, "'In alpibus montium Alborum' (Oakes . . .)."[8] But, unfortunately, when he mapped the ranges of the different species (Karte I), Wettstein was undone by the locality, "White Mountains," and indicated this local species of northern New Hampshire as found only on the White Mountains of Mono County, California, and adjacent Nevada, fully two thousand five hundred miles (4,000 km) southwest of its true habitat and more than one thousand miles (1,600 km) south of the limit of the genus in western North America. Such an error would be paralleled by indicating *E. pumila* of the Tyrol as occurring only on the high mountains of Abyssinia, where no member of the genus is known.

We are inclined to laugh at such instances as the last two and to make sweeping generalizations regarding the European's ignorance of American geography; but, in view of two conspicuous volumes by Americans upon geographic botany elsewhere reviewed,[9] the European may appropriately remind us of the old saying as to him who laughs best. And, surely, no European monograph has equaled for unverified geographic fact two American revisions by outstanding systematists. These cases have elsewhere[10] been discussed, so that here they need be only outlined. In the first case, the American monographer of *Rumex* took up *R. salicifolius* Weinm. as occurring from "Arctic America across to Alaska, south to New Hampshire, the Great Lakes and in the mountains to Southern California and Mexico." Then, after referring to certain variations of the species as thus interpreted, he said: "It may be that these forms will bear separation, even from the Old World type. . . . A more zigzag plant with . . . one valve almost covered by the very large callosity . . . occurs from Sta. Cruz Mountains" to neighboring coasts of California. Had this monographer done the most obvious thing expected of a monographer and consulted the original description of *R. salicifolius* he would have noted that it was characterized by "valvulis integerrimis; unica granifera" and that its habitat was "In California"; thus the absurdity of talking about "the Old World type" would have been avoided. In another instance, Provancher, disliking to use for an endemic American plant the obviously inappropriate name, *Nuphar advena,* substituted for it (in violation of modern retroactive rules) the appropriate name *N. americana* and in his "Flore Canadienne" gave it the broad range: "Lac St. Jean-Géorgie [Lake St. John to Georgia]"; whereupon, later monographers of the group, who devoted some space to scoring the inaccuracy of other botanists, finding Provancher's substitute-name, took it up as a new species with the "TYPE LOCALITY: Lake St. Jean-Georgie, Quebec"! Until American systematists stop perpetrating such gaucheries as these we certainly can not with good grace criticize European blunders in American geography.

But the immediate stimulus which inspired this pro-

[7] Schindler in Engler, "Das Pflanzenreich," iv[225], 101 (1905).

[8] Wettstein, "Monographie der Gattung Euphrasia," 142 (1896).

[9] For reviews see Fernald, *Rhodora,* xiii, 213–224 (1911) and *Ecology,* vii, 510–516 (1926).

[10] See Fernald, *Rhodora,* x, 17, 18 (1908) and Fernald and St. John, *Rhodora,* xvi, 140, 141 (1914).

test is the unintelligent treatment of American geography in a current sumptuous work, in which it was hoped that precision would be the rule. I refer to the folio series of maps now coming out as "Die Pflanzenareale[11] under the direction of competent phytogeographers. The maps of ranges of Old World plants or groups are, we trust, accurate; but the map indicating the ranges of two North American sections of *Acer* so distort the facts that they can not be passed without protest. This map (Karte 4), prepared by Pax, indicates clearly the supposed ranges of the endemic North American *Acer* §§ *Rubra* and *Negundo* and in the bibliography his own treatment of *Acer* in "Das Pflanzenreich" and the treatment in Sargent's "Manual of the Trees of North America" are specially cited as the sources of information. The range of *Acer Negundo* given in the latter authoritative work (in the first edition, which alone is cited by Pax) is "western Vermont . . . southward to northern Florida and westward to the eastern slope of the Rocky Mountains, and to Utah, New Mexico, and eastern Arizona; rare east of the Appalachian Mountains," while the var. *californicum* occurs in "Valley of the lower Sacramento River and the interior valleys of the coast ranges from the Bay of San Francisco to about latitude 35°, and in high cañons on the western slopes of the San Bernardino Mountains, California; connected by intermediate forms from Arizona to Texas, the Indian Territory and Missouri, with the eastern tree." As to the occurrence of the § *Negundo* in Mexico and Central America, the most authoritative statement is that of Standley's "Trees and Shrubs of Mexico," where members of this section are cited from the states of Vera Cruz, Tlaxcala, Mexico, Puebla, Michoacan, Chiapas and Guatemala, but not from Yucatan, Sinaloa and Lower California. The statements of range of this section given by Pax in "Das Pflanzenreich" are entirely consistent with those of Sargent and of Standley, a range indicated, with liberal outside allowance, by the inner or broken line on the accompanying map (Fig. 1). But in spite of having the facts clearly before him Pax publishes in "Die Pflanzenareale" the outside boundary shown, thus making it appear as if *Acer* § *Negundo* extends one thousand miles (1,600 km) northeast of its actual limit to southeastern Labrador and Newfoundland, far outside its southeastern limits into southern Florida and Yucatan, one hundred and fifty miles (240 km) outside its southwestern limit into Lower California and more than one thousand miles (1,600 km) northwest of its true limit into southern Alaska.

[11] "Die Pflanzenareale" . . . Unter Mitwirkung von Dr. Ludwig Diels und Dr. G. Samuelsson herausgegeben von Dr. E. Hannig und Dr. H. Winkler. 1 Reihe, Heft 1 (1926).

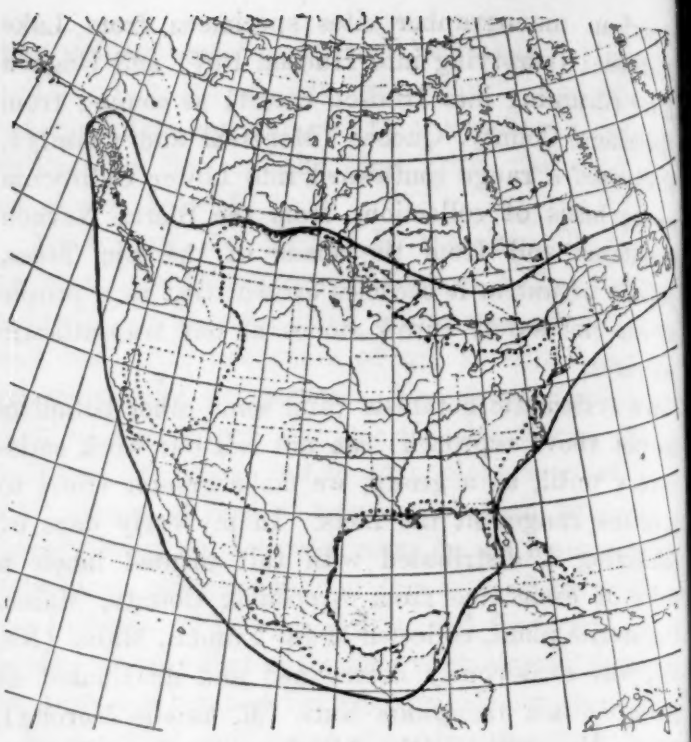

Fig. 1. Inner (broken) line, approximate limit of *Acer* § *Negundo;* outer (continuous) line, boundary as published by Pax.

These different outside areas erroneously given by Pax all have distinctive climates and vegetations, which have been well studied and which are not at all compatible with the occurrence there of *Acer Negundo* of the warm valleys, chiefly of the Mississippi basin and valleys to the south.

In his treatment of *Acer* in "Das Pflanzenreich," Pax gives the eastern and northern limits of *Acer rubrum* correctly as "von Neu-Fundland bis Florida . . . nordwestlich bis zum Winipeg," the other members of § *Rubra* not extending so far north. Nevertheless, in "Die Pflanzenareale" he presents the northern boundary of § *Rubra* (shown in solid line in Fig. 2) as falling nearly five hundred miles (800 km) short of the eastern limit (in broken line) previously and correctly assigned by him, but running at least two hundred miles (320 km) north of its known range in Quebec. Such cases as these, where the monographer of a genus has the true facts definitely before him, but is unable to transfer them to a map without making errors of hundreds or thousands of kilometers, clearly indicate that the editors of "Die Pflanzenareale" have a real problem before them; if the maps they sponsor are to promote science, not retard it, they must visé each one and they must make sure that the distinguished authors of the maps have at least an elementary knowledge of geography and, passing this test, that they take a real interest in presenting the facts without distortion.

This discussion of geographic ignorance, indifference or inexcusable carelessness may seem unduly prolonged; but, in fact, not one per cent. of the instances

FIG. 2. Broken line, approximate northern limit of *Acer § Rubra;* continuous line, limit as published by Pax.

I have noted are here presented. It must, however, be clear that a very vigorous reform is necessary in the work of many of us systematists if we do not wish to be wholly discredited. In systematic zoology, I am informed, the proportion of crude geography is much less, a fact due to the circumstance that more stress has been laid upon geographic variations than is done by many systematic botanists. And, in spite of a general impression among many Americans that it is the European who mangles American geography, enough instances from the work of outstanding American systematists have here been given to indicate that there is little to choose. Our own record is too discreditable to boast about, and not until we make a real effort to brace our own geographic citations can we expect the European to do much better. At present *dis*honors are even. Why not strive to make *"honors* even"?

M. L. FERNALD

GRAY HERBARIUM,
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PLINY EARLE GODDARD

PLINY EARLE GODDARD was born on August 24, 1869. He died on July 12, 1928. His death is a loss for American anthropology that will long be felt. His interest in anthropology was first fostered by personal, intimate contact with California Indians. It was not the occupation with abstract scientific problems that attracted him. It was rather the human interest in their troubles, their thoughts and feelings. It is not an accident that this undertone persisted in all his later scientific work. The native never appealed to him solely as a subject to be examined and dissected, but as a man or woman who had to be understood as moulded by the culture in which he lived.

On this basis grew up his scientific work, broadening over wider fields, as his experience grew. His first, purely human labors with the Hupa Indians taught him the necessity of studying their language. In Benjamin Ide Wheeler he found an appreciative friend who led him on in his linguistic studies. With keen understanding for the need of accuracy he was the first to apply experimental methods to the study of sound systems of American languages. While he remained in California his interest was centered in the study of the Athapascan tribes of that state, their languages, customs, beliefs and traditions.

The study of the present languages and cultures of these tribes led him soon beyond the limits of California. An understanding of modern conditions requires a study of the history of their development, in particular a knowledge of related tribes. The congeners of the California tribes he had studied live in the far north and in the southwest and we find him soon extending his studies over these regions.

The opportunity for this extension of his labors was presented by his appointment as curator of Ethnology in the American Museum of Natural History in New York in 1909. For the Museum he investigated the Beaver Indians of northwestern Canada and later on directed his attention to the Apache and Navaho of New Mexico and Arizona.

It was impossible for him, with his ever-widening interests, not to see the close relation between the problems presented by the southwestern Athapascan tribes and the sedentary tribes of this region and he became a powerful stimulus for the development of recent activities in the southwest. In this the cooperation with Dr. Elsie Clews Parsons was a most important element. In joint labors a systematic ethnological exploration of the Southwest was planned and is still in progress. Many of the results have been published in the Papers of the American Museum of Natural History, in the publications of the American Folklore Society and of the American Ethnological Society. While his own published contributions remained confined to the Athapascan tribes, many others are the outcome of his planning.

The task imposed upon him by the administrative work of the Museum also bore excellent fruit. As the horizon of his knowledge expanded his mastery of the subject grew and he endeavored to do his share in making available to the general public the results of our studies. The highly instructive and artistic groups illustrating primitive life, that tell the casual visitor more than large collections, were made under his directions and his handbooks of northwest coast and southwestern culture are models of a concise, clear representation of primitive culture.

The extent of scientific work conducted under his guidance proves that the scientific tasks of the Museum were not neglected as against its educational functions.

Much of Dr. Goddard's influence on the development of anthropology was due to his personality. He was a man of strong principles; uncompromising in regard to fundamentals; yielding when only minor differences of opinion were at stake. His likes and dislikes were equally intense. Straightforward in his own outlook upon life, he was intolerant of anything that appeared as opportunism. He was particularly appreciative of the enthusiasm of youth and hence exerted a strong influence over the young. He was not given to formal instruction by means of lectures, but through personal contact with his students of Columbia University, in work under his direction in the Museum, in friendly companionship, he gave to them fully from his store of knowledge.

For many years he was entrusted with the editorship of the *American Anthropologist,* and he served the American Anthropological Association, the American Folklore Society and the American Ethnological Society in many capacities. We all shall miss him sorely, not least myself, to whom his personal friendship has meant much for many years—years of severe stress and years of quiet work.

FRANZ BOAS

SCIENTIFIC EVENTS

THE SCHLICH MEMORIAL FUND

IN view of the services of the late Sir William Schlich to the cause of forestry, it was felt after his death that his numerous friends, as well as others who were not personally acquainted with him, would welcome an opportunity of perpetuating his name, and with the object of raising funds for this purpose, a committee was formed early in 1926.

Professor R. S. Troup has acted throughout as secretary to the committee and has been assisted by three local secretaries, Mr. A. Rodger (India), Colonel W. B. Greeley (U. S. A.), and Mr. E. H. Finlayson (Canada).

An appeal for subscriptions met with an immediate response, and the total sum raised up to date (June, 1928) is £1,725, of which £278 has been subscribed in the United States of America. Subscribers were invited to express opinions as to the form of the memorial, and many useful suggestions were received. After giving the fullest consideration to these suggestions, the committee finally decided:

(1) To ask the Forestry Commissioners to set apart an area of forest, to be named the Schlich Forest, situated if possible within easy reach of Oxford and to be available for experimental work; in this area a group of oak trees to be planted and maintained in memory of Sir William Schlich. The Forestry Commissioners have agreed to this proposal, and have the matter in hand.

(2) To have a bronze portrait plaque of Sir William made and erected in the School of Forestry, Oxford. An order for this plaque, at a cost of approximately £24, has been placed.

(3) To place in trust and invest the balance of the sum subscribed, after paying incidental expenses, and to devote the proceeds to the payment of an annual personal grant for the furtherance of study or research in forestry; the grant to be awarded by the trustees to different parts of the British empire and to the United States of America in rotation, the trustees being given discretionary power in the selection of the country in which the award is to be made in any year, and being guided by recommendations received from the country concerned.

THE SUBCOMMITTEE ON SCIENCE AND BIBLIOGRAPHY OF THE LEAGUE OF NATIONS

THE Subcommittee on Science and Bibliography of the League of Nations met on July 20 with Madame Curie, professor of physics at the University of Paris and member of the Committee of Intellectual Cooperation, in the chair.

There were further present:

Mlle. Bonnevie, professor of zoology at Oslo University; Sir Jagadis Bose, founder and director of the Bose Research Institute, Calcutta; Dr. Kruss, director general of the Prussian State Library; M. Emile Borel, former French minister; M. Godet, director of the Swiss Federal Library; M. Roland-Marcel, director of the Paris National Library; Stuart Chapin, professor of sociology at the University of Minnesota; Dr. Cowley, director of the Bodleian Library; M. Otto Jespersen, director of the University of Copenhagen; M. Thibaudet, professor of French literature at the University of Geneva; M. Jonesco-Mihaesti, sub-director of the Bucharest Serological Institute.

The International Institute of Intellectual Cooperation was represented by its director, M. Luchaire, assisted by other officials.

The subcommittee examined a report on the work of the section of science and bibliography of the institute, which was submitted by the chief of section, M. de Vos van Steenwijk.

The subcommittee further dealt with the following questions:

Scientific year-books: The subcommittee noted the results of an enquiry undertaken by the institute to determine whether it was possible and desirable to publish

international scientific year-books. From the exchange of views which was held on the subject it resulted that the institute was instructed to continue its enquiries and to promote the improvement of scientific documentation by recommendations to publishers of year-books or by the publication of an international catalogue of year-books.

List of remarkable works: M. Prezzolini, chief of the information section of the institute, submitted a report on the publication of an annual list of remarkable works published in the various countries. These lists are becoming more complete every year and meet with considerable appreciation. In the list for 1924 only 20 countries were mentioned, in 1925 there were 26 and in 1926 there were 33.

Meeting of library experts: M. Godet submitted a report on the work of the committee of library experts concerning an International Library Information Office. The discussion which followed showed the importance which the directors of libraries attached to information on other libraries. The subcommittee adopted the conclusions of the experts.

Preservation of manuscripts and printed matter: M. Roland-Marcel submitted a report on the work of the committee which had studied means of preserving manuscripts and printed matter. The findings of the committee were adopted.

MOTOR ACCIDENTS IN GREAT BRITAIN

THE London correspondent of the *Journal* of the American Medical Association reports that a deputation from the British National Safety First Association recently waited upon the minister of transport to ask for a full inquiry into the causes of street accidents, and to make suggestions with a view to reducing them. In 1922 there were in Great Britain 2,728 fatal and 79,197 non-fatal accidents in the streets owing to vehicular movement. Last year the number rose to 5,329 fatal and 148,575 non-fatal. It is stated, however, that the rate is slackening in proportion to the number of motors and drivers licensed. Last year the vehicles most involved in fatal accidents were private cars and taxicabs, the proportion being 1,509, or more than a fourth of the whole. Motor vans and lorries, however, made a good second with 1,104 fatalities. Motorcycles, which many regarded as dangerous, were concerned in 784 fatal accidents. Motor-buses and coaches, which carry much of the heavy passenger traffic, figured in only 613, while horse-drawn vehicles were the cause of only 193. In London there were 293 street fatalities during the first three months of the current year, compared with 214 in the corresponding period last year. Excessive speed is declared to be the most fruitful cause of accident, though want of care or hesitation on the part of pedestrians is held to contribute to a great extent. As safeguards, it is urged that there should be more properly surfaced footpaths, more definite regulations defining the priority of traffic at road junctions, and a practical dealing with dazzle lights. Complaints are everywhere being made of the strain which these accidents are placing on our hospitals. Even in the large hospitals, accident patients are causing congestion and delay, and forcing the necessity for extension. In one hospital where accident cases last year cost $4,350, only $650 was received from accident patients, so that the difference had to be made good from other sources. Compulsory insurance has been suggested as a means of providing recoupment. However, Sir Arthur Stanley, president of the Incorporated Association of Hospital Officers, says that compulsory insurance is impossible, for if they told a man or woman that he or she must insure they obviously at the same time told the insurance company that they must take that insurance. The Auto Cyclists' Union had asked all clubs in the country holding competitions where money is taken at the gate to give a percentage to hospitals suffering from the number of motor accidents they treated, and he rather favored that movement. By comparison, railway travel is safe, for last year only twenty-six passengers were killed in train accidents, though the number carried was stupendous. In factories and workshops, accidents last year totaled 156,974, of which 973 were fatal. Here again, taking the whole industrial enterprise of the country, fatal accidents were in number far below those in the street. There is much the same record for coal mines, in which the number of deaths from accident last year worked out at only 1,206, compared with 1,233 in 1925. With regard to the air between January 1 and May 12 this year the number of deaths as the result of flying accidents has been: royal air force personnel, twenty-six; navy, three; army, two.

THE BUREAU OF STANDARDS JOURNAL OF RESEARCH

THE Department of Commerce announced on August 7 the issuance by the Bureau of Standards of a new monthly journal of science, which is to appear at once. According to the announcement this monthly magazine will contain the research papers on fundamental and applied science. It will report the research results of the Bureau of Standards experimental investigations. The bureau has published 942 such research papers in the older series now merged in the new *Bureau of Standards Journal of Research*.

In the series notable papers have appeared of epoch-making importance on such subjects as: The radio direction finder developed at the bureau; levulose, the new super-sweet sugar, first crystallized from water solution by bureau experts; fundamental tests on pyrometric practice, the principles of radio, the

instruments of radio; a classic series on the reflection, transmission and absorption of materials; the determination of the ratio of the electrical and magnetic units of electricity which gives the velocity of light; aeronautic instruments; a summary of some 40 new developments and improvements made in the bureau laboratories; aircraft engine radiators; causes and remedies for failures of railway materials; fire resistance; structural materials researches; chromium plating researches making possible the new notable art of plating this hardest of all metals; photography through fog; luminous efficiency of the firefly—a remarkable classic determination of this interesting quantity as basic standard data for research on artificial light production; basic colorimetry; properties of metals and alloys; measuring the heat of the stars, and hundreds of other topics of fundamental interest to scientists and technicians and of great concern to industry.

The new journal will contain, it is expected, scientific and technical research papers comparable in interests and importance with those already issued.

It is believed that this union of pure and applied science in one journal will tend to shorten the lag between the discovery of some new material or process in the laboratory and its application in industry.

The subscription rate is $2.75 in the United States, Canada, Mexico or Cuba, and $3.50 per year for other countries. The price of single copies is 25 cents domestic and 31 cents foreign. Remittances must be sent to the Superintendent of Documents, Government Printing Office, Washington, D. C., not to the Bureau of Standards.

THE GLASGOW MEETING OF THE BRITISH ASSOCIATION

As has already been noted here this year's meeting of the British Association for the Advancement of Science will be held in Glasgow, opening on September 5. From an article in the London *Times* the following is taken:

The president, Sir William Bragg, will give an address on "Craftsmanship and Science," reviewing in a wide, rather than technical, manner the relations between science and industry. Between 250 and 300 papers will be read, 26 being by women. The two evening discourses will be given by Professor E. A. Westermarck on "The Study of Popular Sayings," and by Professor F. G. Donnan, on "The Mystery of Life." Professor Donnan's address will be a study of the present position in biochemical research.

In the section dealing with mathematical and physical sciences, recent atmospheric researches in relation to flying will be dealt with by Mr. M. A. Giblett, of the Air Ministry, who will speak on "Wind Structure Research at the Royal Airship Works, Cardington." Discussions will take place on the "Mechanism of Thunderstorms" and on the "Photographic Measurement of Radiation." A paper will also be read by Dr. R. A. Watson-Watt on the present knowledge of atmospherics in connection with wireless.

In Section B (chemistry), a series of discussions on current problems in chemistry—fermentation, light reactions and stereochemistry—will take place, followed by an exhibition of cinematograph films lent by Imperial Chemical Industries, Limited, Kodak, Limited, and Sir James Irvine. The Ardeer Factory of Nobel's Explosive Company and other factories will be visited.

In Sections D (zoology) and K (botany), there will be a discussion on a "Biological Investigation of British Fresh Waters." In Section F (economics), a discussion will be held, jointly with Section J (psychology), on the nature and present position of skill in industry; a discussion, jointly with Section M (agriculture), on the incidence of taxation in agriculture; and papers will be read on rationalization in industry.

In Section G (engineering), the presidential address, by Sir William Ellis, will be on the "Influence of Engineering on Civilization." A discussion, jointly with Section L (education), on school, university and practical training in the education of the engineer, will take place.

In Section H (anthropology), Sir Richard Paget will speak on "Evidence of the Nature and Origin of Human Speech" and Sir W. Flinders Petrie on his recent excavations in Southern Judea.

In Section K (botany), a special department of forestry will hold sessions throughout the meeting. Sir John Stirling Maxwell will give a lecture on "Forestry in Scotland, Past, Present and Future." The president of the section will be Professor Dame Helen Gwynne-Vaughan.

In Section L (education), the president will be Dr. Cyril Norwood, headmaster of Harrow. His address will be on "The Next Step in Education." There will be a discussion on "Broadcasting in Education," in cooperation with the B.B.C., opened by Sir John Reith. Sir William Bragg, Sir Oliver Lodge and others are expected to take part in this discussion, which will be followed by a demonstration in a model studio.

Receptions by the Lord Provost and the Corporation will be held in the City Hall, and by the local committee in the Kelvingrove Art Galleries. Entertainments by public bodies, the Chamber of Commerce, Corporation of Paisley, Royal Faculty of Physicians and Surgeons, Platform of the Trades House, Royal Technical College, Institution of Engineers and Shipbuilders, Glasgow and West of Scotland College of Domestic Science, Clyde Navigation Trustees (in connection with their annual inspection of the port and harbor of Glasgow) are also included on the program, in addition to a special service on Sunday, September 9, in the Cathedral of St. Mungo.

SCIENTIFIC NOTES AND NEWS

DR. T. H. MORGAN, of the California Institute of Technology, has been elected a foreign corresponding

member of the Vienna Academy of Sciences. Other corresponding members elected are: Sir Ernest Rutherford, professor of experimental physics in the University of Cambridge; Dr. Johan A. H. Hammar, professor of anatomy in the University of Upsala, and Sir Jagadis C. Bose, the plant physiologist of the University of Calcutta.

ON the occasion of the third general assembly of the International Astronomical Union, the honorary doctorate of the University of Leiden was conferred on M. H. Deslandres, director of the Astrophysical Observatory at Meudon, and on Dr. K. F. Küstner, director of the University of Bonn.

THE University of Heidelberg has conferred an honorary doctorate on Dr. Sven Hedin, the distinguished Swedish explorer.

ON the occasion of the recent dedication of the Research Institute for Psychiatry at Munich, the Kraepelin gold medal was presented to Dr. Oskar Vogt, director of the Kaiser Wilhelm Institute for the Study of the Brain.

DR. JOHANN WANNER, of the University of Bonn, has been elected a corresponding member of the Paleontological Society of America.

THE New York branch of the American Pharmaceutical Association has awarded the Remington medal to Charles H. LaWall, Phar.D., dean of the Philadelphia College of Pharmacy and Science, for his book entitled "Four Thousand Years of Pharmacy."

DR. F. D'HERELLE, discoverer of the bacteriophage, and until recently directeur du Service Bacteriologique du Conseil Sanitaire, Maritime et Quarantenaire d'Egypte, who was recently appointed professor of bacteriology at Yale University, will lecture in Denver at the University of Colorado School of Medicine in October. Dr. D'Herelle is still in Paris convalescing from an illness contracted in Egypt.

MATTHEW W. STIRLING, of Berkeley, California, appointed chief of the Bureau of American Ethnology as successor to Dr. J. Walter Fewkes, took charge of the bureau on August 1. Dr. Alexander Wetmore, acting secretary, introduced Mr. Stirling to the members of the bureau, who assembled in the main office for that purpose.

AT the third general assembly of the International Astronomical Union, which was held at Leiden, from July 5 to 13, under the presidency of Professor W. de Sitter, director of the observatory, there were present three hundred astronomers representing twenty-seven nations. Sir Frank Dyson, astronomer royal of England, was elected president, and vice-presidents were elected as follows: Dr. Frank Schlesinger, director of the Observatory of Yale University; M. H. Andoyer, professor of astronomy at the Sorbonne, Paris; Dr. Georgio Abetti, Italy; Dr. N. E. Nörlund, professor of mathematics in the University of Copenhagen, and Dr. F. Nušl, professor of mathematics in the Technical Institute at Prague. The next congress will be held in the United States.

AT the last convention of the American Society of Clinical Pathologists held in Minneapolis, Minnesota, on June 8, 9 and 11, the following officers were elected: *President,* Dr. Frank W. Hartman, Detroit; *President-elect,* Dr. J. H. Black, Dallas, Texas; *Vice-President,* Dr. Charles R. Drake, Minneapolis; *Secretary-Treasurer,* Dr. H. J. Corper, Denver; *To the Executive Committee,* Dr. A. H. Sanford, Rochester, Minnesota; Dr. John A. Kolmer, Philadelphia; *To the Board of Censors,* Dr. Ernest Scott, Columbus, Ohio; Dr. B. W. Rhamy, Fort Wayne, Indiana.

DR. FRED W. STEWART, assistant in pathology in the Rockefeller Institute, has been appointed associate pathologist at the Cornell University Medical School and assistant pathologist at the Memorial Hospital for Cancer and Allied Diseases.

DAVID H. MADSEN, state fish and game commissioner of Utah, has been appointed superintendent of the new migratory-bird refuge authorized at Bear River Bay, Great Salt Lake, under the Bear River migratory bird refuge bill approved by President Coolidge. He is president of the Western Association of Game Commissioners and has been prominently identified with the conservation of wild life.

THE position of assistant curator in the Division of Mammals, of the U. S. National Museum, made vacant by the appointment of the late Ned Hollister as superintendent of the National Zoological Park in 1916, has been filled by the appointment of Mr. Remington Kellogg. Mr. Kellogg is a graduate of the University of Kansas. From 1916 to 1920 he was connected with the University of California. In 1920 he became associated with the Biological Survey, U. S. Department of Agriculture, as an assistant biologist, and in 1924 was promoted to associate biologist.

PROFESSOR W. H. OVER, curator of the museum at the University of South Dakota, has been called to Lincoln, Nebraska, to appraise a large collection of Indian relics. This collection was formerly owned by an Indian and was loaned to the State of Nebraska for the museum. Following the owner's death, the

heirs and the state agreed upon Professor Over as the man to appraise the collection preparatory to its being sold to the state.

AT the request of Dr. Stephen T. Mather, director of the National Park Service, Department of the Interior, arrangements have been made for Vernon Bailey, chief field naturalist of the Bureau of Biological Survey, to join a party of scientific men who will undertake to correlate the present animal and plant life of the Grand Canyon National Park, Arizona, with geological formations and fossil remains of the former life of that region.

IT is announced in *Terrestrial Magnetism* that F. P. Ulrich, of the Sitka Magnetic Observatory, left early in June for the interior of Alaska to make field magnetic observations and especially to reoccupy repeat-stations. He is using a power-launch and expects to ascend several of the rivers to the north of the Yukon so as to establish some repeat-stations farther north than any now existing. During his absence the routine work of the observatory will be done temporarily by R. H. Paddock, of the Sheldon-Jackson School at Sitka, under the administrative direction of Lieutenant H. A. Cotton, who is commanding the steamer *Explorer* based at Sitka during the present field season.

R. R. BODLE, who has been engaged in field magnetic work for the U. S. Coast and Geodetic Survey in the western states since April 7, has been relieved by Professor S. A. Deel, who will continue the work during the summer.

DR. EDWIN P. CHURCHILL, professor of zoology in the University of South Dakota, has during the past three summers carried out a survey of the fish found in the lakes and rivers of the state. This was completed in July and the collections have been deposited in the university, where the work of identification will be carried out and the material arranged for publication.

DR. LLOYD T. JONES, of the department of physics of the University of California, has been granted a year's leave of absence in order to introduce to the industry the flange weld, which he has recently shown eliminates the difficulties encountered in the girth welds of large diameter pipe lines. The method also reduces the cost of welding.

GEORGE A. PLIMPTON, senior member of the firm of Ginn and Company, who has probably the largest mathematical library of manuscripts and early printed books in the world, sailed for Europe on August 8. Mr. Plimpton has been invited to read a paper on his library before the International Mathematical Congress, which meets at Bologna, Italy, the first week in September.

PROFESSOR LOUIS C. KARPINSKI will represent the University of Michigan at the International Mathematical Congress at Bologna. Professors Rainich and S. Timoshenko, of the University of Michigan, are also to be in attendance. Professor Karpinski is presenting a paper on "Early French Algorisms," Professor Rainich one on a phase of relativity and Professor Timoshenko will speak on work in mechanics.

ARTHUR PAUL JACOT, of the Shantung Christian University, Tsinan, is spending several weeks of July and August in the Inner Diamond Mountains, Chosen, collecting micro-arthropoda and making a preliminary survey of the fauna and flora.

DR. SVEN HEDIN has asked the Swedish Government to make a grant of 750,000 crowns for an extension of his expedition in Asia, urging that scientific opportunities like the present will not be available ten years hence.

DR. FREDERICK L. HOFFMAN will address the students of aeronautics of the New York University, under the auspices of the Guggenheim Foundation, on August 15, on the results of his recent transcontinental air journey, during which he traveled approximately seven thousand air miles. On his return from the West Coast, he made a stop-over in the Navajo country to assist the Bureau of Indian Affairs in connection with the Navajo census. He will address the International Congress of Americanists in September on "Navajo Population Problems."

DR. CRESSY L. WILBUR, formerly director of vital statistics of the New York State Department of Health, died on August 9, aged sixty-three years. Dr. Wilbur, a native of Michigan, was chief statistician on the Federal Census Bureau before entering the New York State service in 1914. He drafted the vital statistics law, first adopted by Pennsylvania, which has become the pattern for similar legislation throughout the country. He also drafted the United States standard certificate of death, which is in general use throughout the world.

THE Duke of Buccleuch, on August 3, unveiled a memorial to the great engineer, Thomas Telford, which has been erected at Midnock, Westerkirk, Dumfriesshire, upon an eminence overlooking the Megget Water and the Esk. Telford was born in a shepherd's small cottage on land close to the site of the memorial. In the village of Westerkirk a handsome library has been erected and equipped out of funds left for the pur-

pose by Telford. The proposal to erect this memorial originated with the Eskdale and Liddesdale Archeological Society at Langholm, which invited the Institution of Civil Engineers—of which Telford was the first president—to join with them.

THE U. S. Civil Service Commission, Washington, D. C., announces a competitive examination for senior toxicologist for which applications must be on file not later than September 5. The examination is to fill vacancies in the bureau of chemistry and soils of the department of agriculture, for duty in Washington or in the field. The salary ranges from $4,600 to $5,200 a year.

THE American Museum of Natural History entertained on August 11 about thirty of the foreign delegates to the fourth International Congress of Entomology, to be held at Cornell University from August 12 to 18. A meeting of the entomological societies of New York and Brooklyn followed the dinner.

THE summer meeting of the American Society of Plant Physiologists will be held at Purdue University, Lafayette, Indiana, on September 4 and 5. A program of short papers covering investigations being conducted at Purdue University will be given the afternoon of September 4. Field trips are planned for September 5, including visits to the experimental orchards, fertility and corn breeding plots. C. L. Porter, West Lafayette, Indiana, is chairman of the local section.

AN anonymous gift of £10,000 has been made to the Animal Diseases Research Association of Scotland at Aberdeen, the income to be used for strengthening and increasing the research staff.

THE non-magnetic survey yacht, *Carnegie*, arrived at Reykjavik, Iceland, on July 20, having encountered head-winds for several days during the passage from Hamburg. The vessel left Reykjavik on July 27, and according to a wireless message despatched on August 3 was at that time proceeding with a fair wind at a point 200 miles southwest of Cape Farewell, headed toward Newfoundland. All the investigations were being carried on according to program and the new plankton-catcher of the model devised by Dr. Pettersson, which was taken on board at Hamburg, was reported as operating successfully. The next port of call will be Barbados, British West Indies, where the vessel is expected to arrive early in September.

THE American Chemical Society announces the winners of the six prize scholarships in the essay contest, established through the gift of Mr. and Mrs. Francis P. Garvan, in memory of their daughter, Patricia. Each of the winners will receive a scholarship, covering tuition, and $500 yearly, for four years. Edward Gregg, of Las Cruces, N. M., was awarded a Yale scholarship for his essay, "The Relation of Chemistry to National Defense." John B. Rae, of Providence, received a Yale scholarship for his essay on "The Relation of Chemistry to Agriculture or Forestry." Ruth Leslie, of Bonham, Texas, a Vassar scholarship for an essay on "The Relation of Chemistry to the Enrichment of Life." Paul Miceli, of New London, a Yale scholarship in the group whose theme was "The Relation of Chemistry to Health and Disease." Sylvia Simon, of Trenton, a Vassar scholarship in the group whose topic was "The Relation of Chemistry to the Home." Esther Lane, of Bisbee, Arizona, a Vassar scholarship in the group dealing with "The Relation of Chemistry to the Development of an Industry or a Resource of the United States."

THE Service Memorial Institute building, recently completed on the campus of the University of Wisconsin, will be ready for occupancy in the fall. Besides allowing expansion of courses in medicine and providing proper research, library and laboratory facilities, the building will centralize many departments allied to medicine and give needed space in several buildings now housing these departments. The building consists of five stories, a basement and a superstructure, built in the form of the letter H, and connected with the Wisconsin General Hospital. The east wing has on the first floor a memorial room and a reading room and offices for the medical school and medical extension libraries. The main book stacks for these libraries are in the basement of this wing. Space is available for 50,000 volumes. In the basement there will be a special plant for making radium emanation.

CONCERTED efforts are to be made in twenty countries before the League of Nations Assembly meets in September to provide treaties prohibiting the hunting of migratory birds after the first of March each year, according to Dr. T. Gilbert Pearson, president of the National Audubon Societies, who has just returned from the World Conference for Bird Protection in Geneva. The birds for which protection is sought especially, he said, are wild ducks, geese, European migratory quail, which hatch in north and central Europe and fly to Africa each winter, skylarks and thrushes.

A HEADQUARTERS forest for the Allegheny Forest Experiment Station has been established at Camp Ockanickon near Medford, N. J. An agreement has

been signed by the chief of the Forest Service and the trustees of the camp for the use of certain areas as the headquarters experimental tract of the Federal research men. This will be one of a number of centers of field work which will be developed in time by the Allegheny Experiment Station in New Jersey, Pennsylvania, Delaware and Maryland. The Camp Ockanickon tract consists of about 500 acres, owned jointly by the county Y. M. C. A.'s of Burlington, Camden, Gloucester and Monmouth. On it are two artificial lakes, one of which already has been developed for recreational purposes. The agreement gives the experiment station the use for a period of years of the land lying back from the lakes.

UNIVERSITY AND EDUCATIONAL NOTES

DR. R. C. WALLACE, professor of geology and mineralogy in the University of Manitoba, will take up his work as president of the University of Alberta on September 1. Dr. Wallace succeeds Dr. H. M. Tory.

DR. R. S. MULLIKEN has been appointed an associate professor in the department of physics at the University of Chicago.

HENRY E. STARR, assistant professor of psychology at the University of Pennsylvania, has been appointed professor of psychology at Rutgers University.

RECENT promotions at Harvard University include that of Dr. H. H. Plaskett to be associate professor of astrophysics, Dr. E. D. Churchill to be associate professor of surgery, Dr. I. J. Walker to be clinical professor of surgery, and Dr. Channing Frothingham to be associate clinical professor of medicine.

DR. EDWIN P. LEHMAN, of the Washington University Medical School, St. Louis, has been appointed head of the department of surgery and gynecology in the University of Virginia.

EDWARD ANDERSON, instructor in steam and gas engineering at the University of Wisconsin, has been appointed assistant professor of mechanical engineering in charge of courses in metallography and heat treatment at the University of Nebraska.

DR. E. A. POHLE, of the University of Michigan, has been appointed head of the department of radiology at the University of Wisconsin.

DR. JOHN F. NORTON, associate professor in the department of hygiene and bacteriology of the University of Chicago, has resigned.

T. C. VANTERPOOL has been appointed assistant professor of biology at the University of Saskatchewan.

M. E. FAURÉ-FREMIET has been appointed professor of comparative embryology in the Collège de France to succeed the late M. Henneguy.

BARON DR. KITASATO, dean of the Keio Medical College and chief of the college hospital, has retired and is to be succeeded in the college by Dr. T. Kitashima.

DISCUSSION

AN X-RAY EXAMINATION OF THE ANHYDROUS Na_2SO_4–$Al_2(SO_4)_3$ SYSTEM

THERE has been some discussion recently as to nature of the anhydrous product, commonly called sodium aluminium sulfate, that is obtained by the high temperature evaporation of an aqueous solution containing equal molar proportions of sodium and aluminium sulfates. The product is said to differ considerably from a mechanical mixture of anhydrous sodium and aluminium sulfates, especially in that it is less hygroscopic. It became of interest to determine whether this difference was due to different physical conditions, such as particle size, to the solid solution of one salt in the other, or to actual compound formation.

A sample of the substance in question was prepared by evaporating to dryness a solution containing equal molar quantities of the two salts and heating the resultant solid to 400° C. During the evaporation the temperature was kept near the boiling point so that there was no possibility of alum formation. An X-ray diffraction pattern made of the powdered substance with molybdenum Kα radiation was entirely different from those of the anhydrous sodium or aluminium sulfates and showed no lines characteristic of either. A series of ten samples were prepared in the same manner, using various proportions of the two salts. Those considerably richer in aluminium sulfate than the first showed lines of aluminium sulfate superimposed on the pattern of sodium aluminium sulfate. The positions of the lines of the latter were unaltered. Those samples containing an excess of sodium sulfate gave the pattern of sodium aluminium sulfate together with some new lines not due to sodium sulfate. The position of the sodium aluminium sulfate lines was again unchanged. It was noted also that the position of the new lines was independent of the relative concentrations of the two components.

These observations seem to establish conclusively that sodium aluminium sulfate is a definite compound and not a mechanical mixture or a solid solution of one salt in another. A mechanical mixture of the two substances would have given the pattern of one superimposed upon the other. A solid

solution might give lines not characteristic of either, but the position of the lines would be altered by a change of relative concentration. Their position, however, was unchanged, even when such an excess of either of the original salts was present that the lines of the minor component were barely visible.

The appearance of new lines with a fixed position in the sodium sulfate-rich samples reveals the formation of a second double sulfate of the two metals. The composition of this salt has not been established, but it contains more sodium sulfate than represented by the formula $Na_3Al(SO_4)_3$.

The complexity of the pattern of sodium aluminium sulfate indicates a low crystal symmetry and no attempt at an analysis has been made so far. The patterns, of course, bear no resemblance to those of soda alum, which is cubic.

F. A. STEELE

PENNSYLVANIA STATE COLLEGE

ANTS AS PROSPECTORS

IN the course of the field investigation of a number of fluorspar deposits in New Mexico occasional information of value was obtained from ant-hills.

A single instance will serve to illustrate their value. In the Little Florida Mountains near Deming, Luna County, a number of fluorspar veins in volcanic agglomerate have been exposed for a short distance. The veins carry iron and manganese oxides, and the outcrop is often concealed. An attempt to follow one of the larger veins beyond the portion exposed by prospect pits failed until the writer resorted to the examination of the materials of the ant-hills along the general projection of the vein. This method was found to be successful in tracing veins concealed by surface material. A mineral analysis of one ant-hill on a concealed fluorspar vein by the use of Thoulet's solution gave the following results:

Lights; rhyolite, quartz, feldspars, etc.	55.2 per cent.
Fluorite	22.5 " "
Iron and manganese oxides	22.0 " "

Another case in which the materials of ant-hills was of geological use was related to the writer by Mr. W. B. Lang. In an areal field investigation in Idaho in a region of much weathered igneous rock the presence of quartz crystals in the material of the ant hills was found to be a satisfactory criterion for the identification and mapping of rhyolite.

The writer is interested in hearing of other cases in which this method has been found to be of value, as it has doubtless been employed many times.

WILLIAM DRUMM JOHNSTON, JR.

U. S. GEOLOGICAL SURVEY,
WASHINGTON, D. C.

MAINTAINING THE STANDARD AND THE SCIENTIFIC USEFULNESS OF THE NATIONAL PARKS

PROBABLY most of the readers of SCIENCE have, within the last few months, received appeals from certain scientific and "conservation" organizations to write to their congressmen and senators opposing measures to add to the national park system areas which the parties sending out these appeals claim are inferior and unsuited for national park purposes. They warn that there is "serious danger of lowering the standard of the national parks" and claim that no areas should have a place in that park system unless they have natural scenic wonders of outstanding character, such, for instance, as those of the Yosemite or the Yellowstone.

This is a matter in which the scientific men and organizations should do some thinking for themselves instead of letting it be done for them by others. Why should the purposes of the national parks be limited to preserving extraordinary scenic places and to catering to vacationists? Why should they not do some service for the sciences of ecology, zoology, botany, etc., by preserving in their natural conditions some areas that will not be overrun and trampled upon by hordes of tourists? Modern transportation methods are resulting in settling and commercially developing almost every part of our country. The national parks are the chief hope of retaining any tracts in a natural state.

Certainly we should include in the parks the finest and the least spoiled areas that a given region of the country affords, but if it contains no Grand Canyons or Mt. Rainiers that is no reason why every place should be given over to destructive exploitation or why those who have not the time and money to travel long distances should not have such attractive natural scenery as exists in their own part of the country preserved for their enjoyment and for protecting the animals, plants and ecological characteristics of the region for scientific study. No claim can be more preposterous than that the great scenic features of the parks in the western states will lose a particle of their interest or beauty if we also preserve from destruction some of the beautiful though less extraordinary areas in the east or south.

The state of Pennsylvania has recently had to appropriate $450,000 and its citizens have had to raise an additional $200,000 by private subscription to preserve the last remnant of the white pine forest which covered thousands of square miles in the eastern states a couple of centuries ago. How long will it be before we are buying back for national parks at enormous

cost areas that Congress might now set aside for that purpose for nothing?

Nothing could be more satisfactory to those wishing to exploit for their own benefit the resources of the public lands than to have the public imagine that the development of our national park system has almost reached its desirable or practicable limits. That is very far from being true, but unfortunately the Forest Service, which does not wish to give up lands to the parks, and the National Park Service, which desires not the enlargement of the park system but the development of the road and hotel systems of the present parks to improve them as business propositions, are doing their best to encourage such a belief.

At a recent hearing before a Congressional committee the representative of a well-known organization who appeared in opposition to adding a certain area to the park system proved to have no information as to what was on the area in question and could give no reason for opposing its addition other than that certain government officials did not wish it included.

It is a matter of record, which any one so disposed may verify, that the same bureaus and organizations that are now so exercised over the possible lowering of the standard of the parks by making a few small additions to them are the ones who initiated and promoted the legislation in 1921–1923 to lower the standard of the Sequoia Park by eliminating half the park (containing at least two thirds of the sequoia trees the park was established to protect) and opening the area up to commercial use. They have never protested at, or given publicity to, the lowering of the standard of the Yosemite Park, which has been going on for years through the logging and railroad building operations of a big lumber company that have wiped out practically all the finest parts of its forests and ruined from a scenic standpoint two of its three sequoia groves. Publicity would have ended that vandalism. In 1925 and 1926 they initiated legislation to lower the standard of the Rocky Mountain Park by excluding most of the best timbered parts of it. Can they now venture to deny that trimming Crater Lake Park for the elimination of the splendid forests in its southern part is on the program of the government bureaus?

It is not the addition of attractive, even if not extraordinary, areas to the park system that lowers its standard. It is logging, railroad and reservoir building and other commercial developments and also "boundary adjustments" to legislate out timber or other resources desired for exploitation that are lowering the standard of the parks, and doing it in a way that no future regrets or efforts can remedy.

WILLARD G. VAN NAME

NEW YORK

DICTION IN SCIENTIFIC WRITINGS

Now that the pronunciation of "research" is cleared up, perhaps some one can illuminate an obscurity occurring in the writings of even the best scientists. I read that something is "1,000 times larger" than something else. Does he really mean that, or does he mean "1,000 times as large?" The difference in this case is not particularly significant, but becomes so if, for example, the thing compared is "three times larger." I would be inclined to take his statement at its face value until I see that something else is "100 times smaller" than the thing with which it is compared. Now how can anything be more than once smaller than anything else? Would it be any harder to say "one hundredth as large" if that is what is meant?

R. L. EDWARDS

MIAMI UNIVERSITY

A SUBSTITUTE FOR "BELIEVE"

DR. MILLER has suggested that there is an ambiguity in the use of the word "believe" in scientific articles and called for a substitute. Perhaps the word "opine" might do. This word is defined as follows in Webster's New International dictionary:

> opine:—to have, express, form, or hold, an opinion; to give out formally as one's opinion, or to give a formal opinion; to judge; think; suppose.

ELLIS I. FULMER

IOWA STATE COLLEGE

QUOTATIONS

THE USE OF LEAD TETRA-ETHYL

ETHYL has stood her trial, and the jury have returned a Scottish verdict of *Not Proven.* That is the sum and substance of the unanimous report of the Departmental Committee appointed last April to inquire into

> the possible dangers to health resulting from the use of motor spirit containing lead tetra-ethyl or similar lead-containing compounds, and to report what precautions, if any, are desirable for the protection of the public or of individuals in connection with the use or handling of such motor spirit.

The appointment of the committee was the result of a good deal of discussion, both in the press and in Parliament, following the announcement that the Anglo-American Oil Company had produced Pratt's ethyl petrol for ordinary motorists' use with the

object of eliminating or substantially reducing the knocking of engines, and thus of adding to their efficiency. Our motoring correspondent explained at the time that the ethyl brand of anti-knock compound contained tetra-ethyl lead, ethylene dibromide, halowax oil and red aniline dye. The first ingredient was said to eliminate knocking; the second prevented the formation of lead oxide during combustion; the halowax oil served as a lubricant; and the red dye was for the purpose of identification. The compound had been used for racing and for aeroplane engines—about one teaspoonful of the liquid being added to a gallon of petrol; but otherwise its use in this country had been very limited, though it had been extensively used in the United States for some years. There seems no doubt that insufficient precautions in manufacture and handling tetra-ethyl had in fact led to deaths in the United States in 1924, and it was largely due to these unfortunate occurrences that the introduction of ethyl petrol for general use in this country was vigorously opposed until this distinguished committee of inquiry, under the chairmanship of Sir Frederick Willis, was appointed by the Minister of Health.

The committee found at once that the American government had already made a very thorough investigation of the same problem, and Surgeon-General Cumming not only placed at the disposal of the British committee the information obtained at the American inquiry, but also arranged for Dr. Leake, who conducted it, to come to London to give evidence. Without going into the technical aspects of the proceedings, it is sufficient to say here that the United States committee had followed up the few reported cases of injury to health which might have been due to the use of ethyl petrol; that they had satisfied themselves that these cases afforded no evidence of harmful effects attributable to the use of this material; and that at the time of the American report there were no good grounds for prohibiting the use of ethyl petrol, of the composition specified as motor fuel, so long as its distribution and use were controlled by proper regulations. Prohibition of the use of the fuel had been removed in all parts of the country—in New York as recently as June, 1928—and Dr. Leake said that, in spite of the wide publicity that the matter had received, no instances of injury had been found. Sir Frederick Willis's committee now declare that the findings of the American committee were justified. They say that there is no evidence to show that the use of ethyl petrol as a motor fuel involves more dangers to health than the use of ordinary petrol; but for the time being they think that the precautions indicated in the American report are desirable. In other words ethyl should be used as a motor fuel only, and not for such purposes as cooking or cleaning. No regulations have actually been made in the United States as regards the distribution of this petrol, but it is stated that careful observance of the regulations recommended—*e.g.*, in regard to notices to the public, the labelling of cans and pumps, the distribution of leaflets and the dyeing of the substance red as an additional check against its use otherwise than as a motor fuel—has been secured by the terms of the contracts between the proprietors of the fuel and the retailers. Sales in this country are governed in the same way, and the report does not recommend any legislative action so long as the terms of the contract are maintained. Further investigations are to be made, but there is no reason to suppose that the committee will find it necessary to modify the views they have now expressed. It is of course common knowledge that empyreumatic fumes are unpleasant and sometimes dangerous, and that the adequate ventilation of garages is very important whether ethyl petrol is used or not. But the report makes it clear that the danger is not from lead poisoning but from carbon-monoxide.—*The Times, London.*

THE BAKING POWDER CONTROVERSY

FOREWORD

FOR forty years the discussion of the use of alum in baking powder has been going on in this country almost continuously. At times it has become bitter in its terms. It has secured the opinions of perhaps two hundred experts, most of whom are of high character and standing. It never had been prominently brought before the courts until the last few years. Manufacturers of alum baking powders objected to a manufacturer of tartrate baking powders using the phrase, "no alum." They induced the Federal Trade Commission to issue a complaint against the Royal Baking Powder Company, charging the company with unfair competition. Voluminous evidence was taken in the case, and finally the Federal Trade Commission, after receiving the report of the examiner in the case, ordered the complaint which they had brought against the company dismissed.

The above order was issued on the 23rd day of March, 1926. The commission partly opened up the subject again for further evidence in an order issued on July 7, 1926. One of the commissioners was gravely in doubt of the legality of reopening a case which had once been settled by the dismissal of the complaint. This legality has already been challenged in the supreme court of the District of Columbia but not yet decided therein. In many respects this con-

troversy is the most notable of any that have taken place in the courts with direct or indirect relation to the proper enforcement of the act establishing the Federal Trade Commission.

Following is a list of recent books on the subject:

Potassium and Tartrates, a review by Ralph W. Webster, Ph.D., M.D. With a digest of the literature, by W. A. Brennan, A.B., published by The Commonwealth Press, Chicago, Ill. Pages, including bibliography and index, 168.

Aluminum Compounds in Food, including a digest of the report of the referee board of scientific experts on the influence of aluminum compounds on the nutrition and health of man by Ernest Ellsworth Smith, Ph.D., M.D., fellow and former president, New York Academy of Sciences, fellow of the New York Academy of Medicine, etc. Published by Paul B. Hoeber, Inc., New York, N. Y. Pages, including bibliography and index, 378.

Modern Baking Powder, by Juanita E. Darrah, A. B., M. S., University of Illinois, A. M. Columbia University, fellow at Johns Hopkins University School of Public Health, formerly associate professor, College of Industrial Arts, Denton, Texas, and later professor and research specialist, Florida State College for Women; author of the second edition, "Your Children's Food." Distributed by the Research Department of Calumet Baking Powder Company, Chicago, Ill., 1927; published by The Commonwealth Press, Inc., Chicago, Ill. Pages, 125.

The Truth About Baking Powder, sworn scientific testimony and government exhibits from records in Docket No. 540, Federal Trade Commission, Washington, D. C., compiled and distributed by Calumet Baking Powder Company. Pages, 172.

The Current Significance of the Word "Alum," by William D. Richardson, former editor of *Industrial and Engineering Chemistry,* The Commonwealth Press, Inc., publishers, 112 South Wabash Ave., Chicago, Ill. This booklet contains sixty-two pages and thirty-one additional pages of authorities. It is an answer to a smaller book entitled, "The Meaning of the Word Alum," by Austin M. Patterson, Ph.D.

This group of books is unique in several respects. When I received the first one, which was "Potassium and Tartrates," I looked it over with a great deal of interest and without the least suspicion of the purpose of its preparation. I naturally expected that it was what it claimed to be, a physiological study particularly of the toxic effects of potassium. The material was evidently collected with care, proper citations to the authorities are given, and apparently ethical discussions of the problem involved are found. Attention is called to the fact:

> In early life the rapid growth of the tissues requires potassium and much of the potassium ingested in the food is retained. However, as Frontini shows, after the age of 12 years the retention gradually grows less and only that which may be regarded as more or less normal is held by the cells. In their analyses of the ashes of new-born and of young children, Bunge, Abderhalden, Camerer, and Söldner, von Steinitz and others have found 9 to 13 per cent. of the ash attributable to potassium. That potassium is especially required by the growing child is shown by the fact that 38.6 per cent. of the ash of human milk is represented by this element as reported by von Wendt. Miller has established the point that inadequate potassium during the early development of the organism not only prevents the growth of the body tissues, but also causes abnormal physiological changes, which make themselves apparent later on.

The well-known physiological functions of potash and the fact that it is regarded as highly necessary in proper quantities are well-known physiological truths. Of course there is no disputing the statement that an excess of even a good and necessary element in our food is always undesirable. It is well known that during the grape season in many parts of Europe numerous grape cures are established and kept functioning every year. Many patients attend these grape cures, apparently with great benefit. During this period they eat a very great excess of grapes, and the potash, which is the principal mineral constituent of grapes, apparently acts favorably from the point of view of restoration to health.

As tartaric acid is distributed in nature, largely in grapes, this fruit may be regarded as the principal source of the potash which we take into our systems normally in eating grapes freely and drinking wine, which by many are regarded as restoring patients practically to health and vitality.

As we look over the literature which has been collected in this book, we find stressed many references to disturbed conditions established by the use of potassium and tartrates. The poisonous effects of tartar emetic have long been known, but the antimony has usually been blamed for these effects, rather than the potash and tartaric acid.

The most abundant preparation of tartrate of potassium, and the most common, is potassium bitartrate. It is described in the tenth revision of the Pharmacopœia, on page 206.

Webster describes cream of tartar as a cooling, acidulous salt, agreeing favorably with delicate stomachs. It is valuable for its ideal diuretic properties and is perhaps the most ideal diuretic used by physicians. The salt is recognized as a diuretic and as a grateful, cooling saline in feverish conditions.

My first impressions, which I gained on reading this book, in a cursory way, were that it was a valuable contribution to the literature on the subject. There was nothing in it in any way to induce me to believe

it was written for any other purpose than for the advancement of science.

Dr. Smith's book I found a well-written, logical discussion of the uses of aluminum in our foods. From the very beginning of food control alum has been an object of suspicion by practically every writer, chemical or physiological, that has mentioned the subject. In Accum's writings of over a hundred years ago, lately collected in a most admirable manner by Dr. Charles A. Browne, the presence of alum in foods was regarded by Accum as an example of "death in the pot." In the early days alum was added to the bread for bleaching purposes. There has long been a craze, not founded upon any scientific fact, but rather in contempt thereof, for making our bread whiter. The use of alum was one of the first objectionable adulterations to which the attention of chemists and physiologists was called. Dr. Smith's volume is a valuable contribution to the establishment on an alleged scientific foundation of the benefits which are expected to accrue by the more general use of alum in our foods. The powerful influence of the Remsen board of consulting scientific experts is cited as one of the principal reasons why the use of alum in our foods, both as alum and in the form of alum baking powder, should be more generally extended. The argument is made skilfully and with more or less convincing force, especially on those who are not inclined to investigate problems of themselves. When such eminent authorities are cited in favor of the use of alum, the ordinary citizen can not be blamed for following the evidence adduced. When, however, this evidence, marshalled so skilfully by Dr. Smith, comes under the light of criticism in the opinions of other experts, it is bound to lose its luster and also its power of conviction. While the pro-alum forces could not have been marshalled in a more masterly way, the general impression is that the facts are not convincing, that the soundness of the conclusion is only superficial and that the real physiologist, moved by a spirit of interest in the welfare of humanity, will not become a devotee to the use of alum in any form or shape in human food.

Miss Juanita E. Darrah's publication, entitled "Modern Baking Powder," is a plain, open, honest contribution of the Calumet Baking Powder Company to the literature favoring the more extensive use of alum in our foods. Citations are made of nearly all vegetable foods and the argument is presented in this way—I quote some of the head lines in the book—"Coffee Contains Phosphate and Aluminum," "Tea Contains Phosphate and Aluminum," "Bread Contains Phosphate and Aluminum," "Wheat Contains Phosphate and Aluminum," "Corn Contains Phosphate and Aluminum," "Rice Contains Phosphate and Aluminum," thus throughout the whole book every article mentioned contains a similar description.

One of the curious arguments of Miss Darrah's book is found upon pages 49 and 50, as follows:

> The Food and Drugs Act declared any article of food adulterated "if it contain any added poisonous or other added deleterious ingredient which may render such article injurious to health."
>
> The food laws of every state contain similar provisions. The fact that baking powder containing Phosphate and S. A. S. (sodium aluminum sulphate) has not been proceeded against under these provisions of the law is a true sign that such baking powder does not contain a poisonous or deleterious ingredient, or one that may render such article injurious to health.

This is a most ingenuous argument and a perfect example of *non sequitur*. At the very beginning of the enforcement of the federal food and drugs act certain articles were taken out of the list of offenders against the law and given complete immunity from any efforts of a legal character to restrict these articles or to prevent them from being added to our foods. When the Remsen board of consulting scientific experts was appointed, certain problems were transferred from the Bureau of Chemistry, which had under the law supervision thereof, for study and investigation by the Remsen board. The secretary of agriculture issued a proclamation forbidding any interference with these favored ingredients pending the report of the Remsen board thereon. Among these exempted articles was alum. The reason alum was not proceeded against was not because of any belief that it was a harmless substance, but because of the immunity which had been granted it. When the Remsen board did report on alum it was a complete exoneration thereof of possessing any deleterious or poisonous qualities. The immunity therefore which has protected alum for the last twenty-two years is due solely to the decision of the Remsen board that has not yet been repealed.

Enclosed with Miss Darrah's book was a typewritten foreword by Marian Jane Parker, home economics and domestic science, 1020 S. Karlov Ave., Chicago, Ill. This foreword calls attention to the fact that Miss Darrah shows that the amount of alum ingested in our daily diet of fruit, vegetables and meats is many times the quantity that is taken into the body from baking powder products. If this be true, the quantities of alum ingested are already up to and above the physiological limit and, therefore, this would be a reason for not adding more thereto. Naturally, as clay, a silicate of alumina, is the basis of all our agricultural soils, traces of aluminum in some form or

other would find their way into crops grown on a soil of this kind. Analyses of agricultural products, made by Langworthy and Austen in the Department of Agriculture, show the quantities of alum in our agricultural food products to be extremely minute. It is not likely that the combined intake of aluminum from the sources mentioned would in any way equal the hundreds of tons of alum taken into our stomachs every year through the wide-spread use of alum baking powders. The very warning that Miss Parker gives should be a danger signal not to increase beyond a minimum content the intake of aluminum compounds in our foods.

"The Truth about Baking Powder" is chiefly concerned with the evidence showing that S.A.S. (sodium aluminum sulphate), which is an alum according to the common definition of the term, is not, in point of fact, alum as it is understood at the drugstore. Copious extracts from evidence to establish that fact form the bulk of the book.

"THE CURRENT SIGNIFICANCE OF THE WORD 'ALUM'"

Dr. Richardson's work is peculiarly well written, in a proper ethical spirit and was copyrighted by himself in 1927. It bears no indication of having been written in any spirit except that of a difference of opinion as to the scope to which the term alum should apply. It was published, evidently, by interests engaged in the production of alum baking powder. It thus belongs to the category of the other books mentioned in this discussion. They are all intended for propaganda to further popularize the use of alum in our foods. There can be no valid objection to propaganda of this kind if it is plainly labeled. The vice in this particular case lies in trying to conceal this purpose. In two cases the title page contains a statement that the book was in the interest of alum baking powder. In the other cases such information is not found. The greater number of readers of these books (including myself) would naturally conclude that the authors had no ulterior purpose beyond stating facts and drawing unbiased conclusions therefrom. I was not even rendered suspicious by the fact that all these publications came to me without a bill. The chemical authors are my personal friends.

Mr. Richardson pays a high compliment to Dr. Patterson's contribution. He says:

> Dr. Patterson has taken great pains in looking up authorities and his presentation is a scholarly one. The bibliography of the subject which he has worked up is extensive and the quotations which he introduces are correct * * * The author is indebted to Dr. Patterson for many references and takes this opportunity to express his appreciation of the pains-taking way in which Dr. Patterson has investigated the early, middle and recent history of alum. Dr. Patterson and I agree with reference to our authorities but we differ widely in our conclusions.

Dr. Richardson takes the ground that the term "alum" should be applied strictly to its original chemical definition as a double sulphate or aluminum and potash or ammonia. He accedes, however, to the chemical definition of the term alum in general, which is a double sulphate of aluminum and any other metal that will fit in and produce a sulphate of similar crystallographic structure.

Dr. Patterson, on the other hand, claims that sulphate of alumina alone is also entitled to the name alum, and particularly when used without water of crystallization in baking powders.

Officials of the United States and states when called upon to enforce the national and state laws have placed upon them an obligation expressed by the phrase *noblesse oblige*. Their first duty is to the people of their respective states and of the whole country. When the Bureau of Chemistry was selected by law to enforce the National Food and Drugs Act, its officers were animated by the one supreme obligation, namely, that, when doubt existed of any kind as to whether the given article of food or drugs was adulterated or misbranded, the decision should always be in favor of the people of the United States. If any harm or injury were done to the manufacturer and dealer they had full recourse to defend themselves before a federal judge or, in the states, before a state judge. It seems to me that this is the attitude which the instructed citizen at large should take in regard to the use of alum in our foods. If there is any doubt as to the wholesomeness of alum we should incline to the decision that it ought to be forbidden in our food products.

HARVEY W. WILEY

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

ETHYLENE GLYCOL AS AN ATMOMETER REAGENT TO MEASURE THE EVAPORATING ENVIRONMENT AT TEMPERATURES BELOW FREEZING

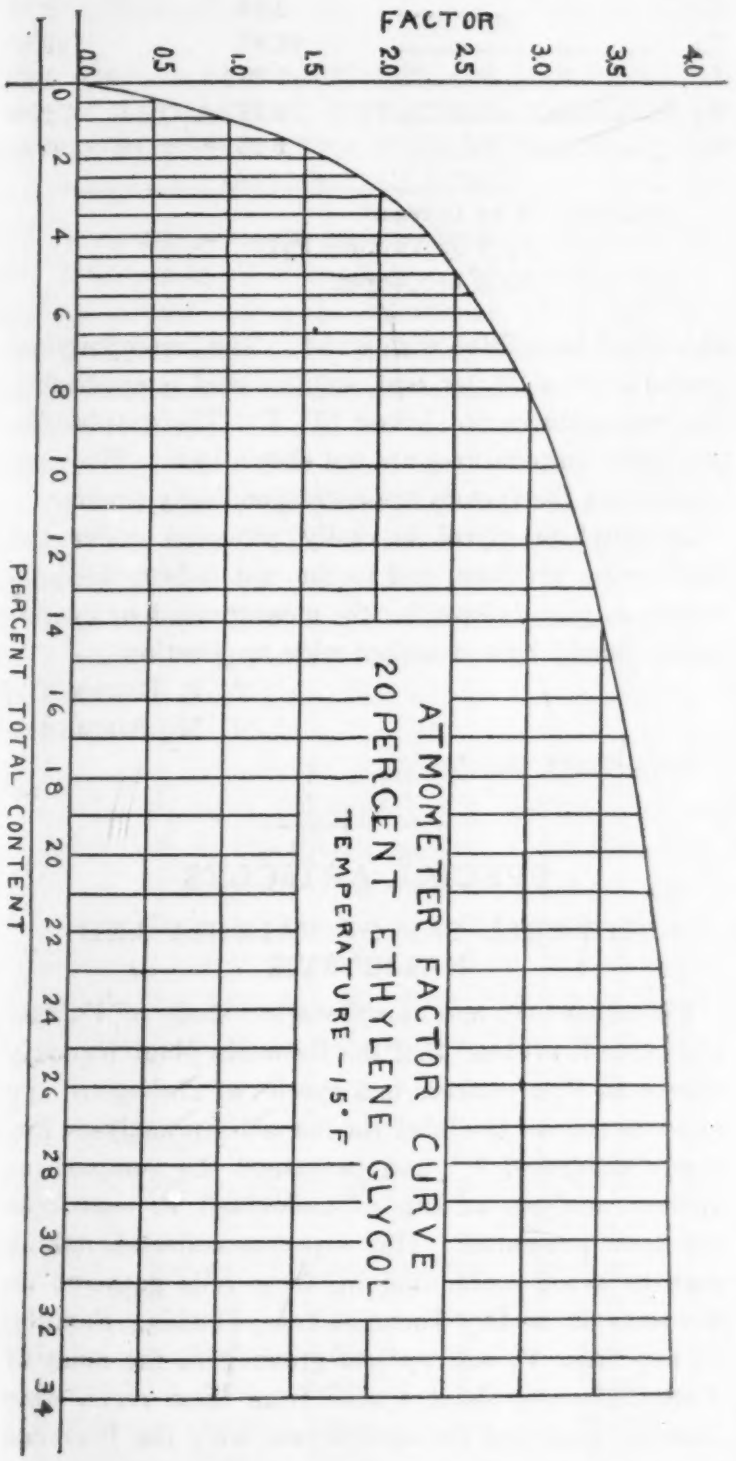
IN certain investigations where it is necessary to measure the evaporating environment, limitation is encountered when the temperatures are below freezing, especially at the beginning and toward the close of the active growing season. For want of a desirable anti-freeze compound there is practically nothing to tell us what the evaporating complex is during periods of cold weather.

Inasmuch as ethylene glycol has certain chemical and physical properties which make it an ideal solution to use in automobile radiators to prevent freezing during winter weather, it seemed probable that such a compound should lend itself as an atmometer reagent to measure the evaporating environment when the temperature was low.

In the recommendations which are given automobile drivers, the concentration of ethylene glycol[1] to be used is determined by the temperature which is current at the particular time. For temperatures approximately 15 degrees F. a 20 per cent. solution is used; for a temperature of −15 degrees F. a concentration of 40 per cent. It might be necessary to use a 50 per cent. solution or even a sixty per cent. solution. But this is true that the stronger the solution the greater is the force necessary to evaporate water from it. The more concentrated the ethylene glycol the longer will be the time necessary to evaporate the mixture to a given volume.

In the procedure which was used in determining the atmometer factor the cylindrical type of standardized atmometer was used. The simple type of mounting was employed, but each was provided with a Livingston-Thone[2] valve, to prevent any inflow as a result of possible condensation. The solution used took into consideration the temperature at which the evaporating environment was contemplated. For this section of the country at least, the 20 to 40 per cent. solutions are the only two concentrations necessary and will take care of all such temperature conditions as would likely be encountered. Where the temperature reaches a lower point a 50 per cent. solution is advisable. A solution of this concentration has a corresponding relation as far as its factor is concerned.

To secure the factor, one half of the atmometers were filled with distilled water in the usual way and the other half were filled with the ethylene glycol solution. They were placed alternately around the periphery of a revolving table and caused to rotate. The method is much the same as is used in standardizing atmometers. The containers were marked so that the percentage of the total content evaporated might be determined at any time. The evaporation from the ethylene glycol solution is less than that from water and naturally as evaporation proceeds the concentration of the ethylene glycol solution becomes greater; at the same time there is a greater resistance to the passage of water. If the amount of water loss for a given interval from the ethylene glycol solution is designated as Y and that from distilled water as W, the factor X is secured by dividing W by Y. Stated algebraically this is as follows: $X = \frac{W}{Y}$. The relation is made clear from an examination of the accompanying graph for the 20 per cent. ethylene glycol.



All one needs is to be sure that he has the given concentration of ethylene glycol to start with. This may be readily secured by determining the specific gravity. At the end of the period of exposure the percentage of the total initial amount is determined, and by interpolation on one of the graphs the factor is found. The product of the factor times the actual amount evaporated from the ethylene glycol gives the reading which would have taken place in an atmometer

[1] Curme, G. O., and Young, C. O., "Ethylene Glycol," *Indus. and Engin. Chem.* 17 (11): 1117. 1925.

[2] Livingston, B. E., and Thone, Frank, "A Simplified Non-absorbing Mounting for Porous Porcelain Atmometers," SCIENCE, 52: 85–85. 1920.

TABLE I
MOLAR COMPOSITION OF SAPS EXPRESSED AS PER CENT. OF HALIDE

	A	B	C	D	E
	Sea water Bermuda	*Halicystis* Bermuda	*V. macrophysa* Bermuda	*V. macrophysa* Tortugas	*V. ventricosa* Tortugas
Cl + Br	100.00	100.00	100.00	100.00	100.00
K	2.15	2.58	86.24	82.33	94.74
Na	85.87	92.80	15.08	18.55	5.73
Ca	2.05	1.36	0.288	0.02	Trace
Mg	9.74	2.49	Trace ?	0.08	Trace
SO_4	6.26	Trace ?	Trace ?	0.04	Trace

Analyses: B by Dorcas.[2]
A, C by Van der Pyl.[3]
D, E by Cooper.

which had been filled with water. The accompanying graph is for a 20 per cent. solution and is applicable for temperatures not below 15° F. The graphs for the lower temperatures are not shown here. They are similar but the factors are correspondingly greater.

As ethylene glycol is easily procured under the trade name prestone, and as the cost is low, the procedure as given above for the measurement of evaporation should have a rather wide application.

A. L. BAKKE
J. M. AIKMAN

IOWA STATE COLLEGE

SPECIAL ARTICLES

THE CELL SAP OF VALONIA AND HALICYSTIS

PHYSIOLOGICAL and morphological study of *Valonia* has made it evident[1] that the Bermuda plant formerly known as *V. ventricosa* is a species of *Halicystis*. In order to correct the label for the cell-sap analyses formerly published [2, 3] and to extend the comparison, further analyses of sap of undoubted *V. ventricosa* are here presented. This sap was collected, taking care to avoid contamination, from cells gathered on the reefs at the Dry Tortugas keys, Florida. Samples of sap from *V. macrophysa* growing in the moat of Fort Jefferson, about a mile from these reefs, were likewise analyzed for comparison with the Bermuda species.

Potassium was determined as perchlorate; sodium as sodium chloride; calcium as calcium oxide; magnesium as magnesium pyrophosphate; halide by titration with silver nitrate; and sulphate as barium sulphate.

The maximum errors to be expected, from the determination of a known solution, are: potassium 0.5 per cent. too low; sodium 3.0 per cent. too high; halide 0.3 per cent. low; when porcelain is used. The determina-

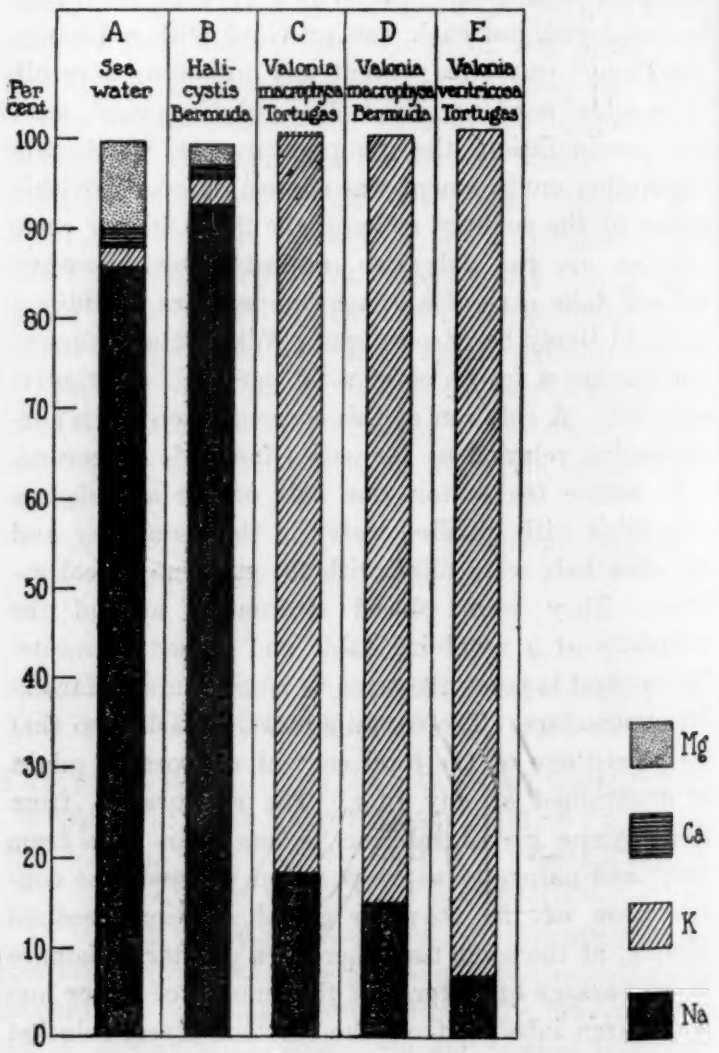


FIG. 1. Graph showing molar concentration, expressed as per cent. of halide, of the chief elements in the saps of *Valonia ventricosa*, *V. macrophysa*, and *Halicystis*, compared with sea water.

[1] Blinks, L. R., SCIENCE, 1927, lxv, 429.

[2] Osterhout, W. J. V., and Dorcas, M. J., *J. Gen. Physiol.*, 1924–25, vii, 633.

[3] Osterhout, W. J. V., *J. Gen. Physiol.*, 1922–23, v, 225.

tions for *V. ventricosa* were made in fused quartz, so the errors should be smaller.

The results of these new analyses, together with former ones, are listed in Table I and presented graphically in Fig. 1. The striking dissimilarity between *Halicystis* and *Valonia ventricosa,* with which it formerly was identified, is very noticeable. The genus *Valonia,* on the other hand, falls into a natural group, although each species is distinct enough in its sap for chemical diagnosis. The *V. macrophysa* from Fort Jefferson is seen to vary in the opposite direction from *V. ventricosa* with reference to the Bermuda species. The presence in it of more sodium, as well as of measurable amounts of calcium, magnesium and sulphate, raises the suspicion of contamination or of injury. It seems possible from our experience that these cells are not healthy in the summer. They are much shorter lived in the laboratory than *V. ventricosa,* and readily form zoospores, to the destruction of the protoplasm. Their electrical conductivity is higher than that of the Bermuda species, and it is possible that there is an entrance of sea-water ions and an exit of potassium.

The amount of potassium found in *V. ventricosa* is consistently greater than in *V. macrophysa.* This is evident from Table II, which shows analyses of saps from cells exposed to varying conditions.

Grateful acknowledgment is made to the Carnegie Institution of Washington for use of the facilities of its Marine Biological Laboratory at Tortugas.

SUMMARY

Comparison is made between the saps of *Valonia ventricosa* of Florida and the Bermuda *Halicystis,* formerly known as *V. ventricosa.* An even higher percentage of potassium is found in *V. ventricosa* than in *V. macrophysa,* while *Halicystis* has been shown to have very little.

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L. R. BLINKS

THE ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH

THE PROBABLE AMOUNT OF ULTRA-VIOLET RADIATION OBTAINED INDOORS THROUGH ULTRA-VIOLET TRANSMITTING GLASS

THE recent advances in heliotherapy have led to the development of a number of ultra-violet transmitting glasses and glass substitutes which are designed to give ultra-violet radiation indoors. One of the best transmits from 50 to 60 per cent. of the solar radiation between 290 and 320 mμ when it is new and about 30 per cent. after it has aged. If it is used in a solarium there is no doubt that a patient exposed to the direct rays of the sun under it would get about as much ultra-violet radiation in three hours as he would get in one hour in the open sunshine, provided the intensity of the sunlight remained the same. But ultra-violet transmitting glass is also being sold for school and office windows, and the question arises as to how much ultra-violet radiation can be obtained in a room where it is installed. A worker indoors would not sit in the direct sunlight because of the glare and, although the illumination in a room falls off rapidly from window to wall, it is perhaps safe to assume an average illumination of ten foot-candles. One would like to know, therefore, how much ultra-violet radiation reaches a point inside where the

TABLE II
SAP CONTENT OF VALONIA VENTRICOSA

	A		B		C		D		Av.: B, C, D
	Molar	Per cent.	Molar	Per cent.	Molar	Per cent.	Molar	Per cent.	Per cent.
Cl + Br	0.620	100	0.588	100	0.605	100	0.697	100	100
K	0.587	94.74	0.537	91.35	0.574	94.90	0.654	93.85	93.37
Na	0.35	5.73	0.057	9.70	0.038	6.28	0.046	6.60	7.53
Ca	Trace	.....	0.0007	0.12	0.0006	0.09	Trace	.....	0.11
Mg	Trace	.....	0.0003	0.05	0.0002	0.03	Trace	.....	0.04
SO_4	Trace	.....	Trace	.....	Trace	.....	Trace	.....	.....
	Freshly gathered June, 1927.		Three weeks in changing sea water. August, 1926.		Three weeks in closed bottle of sea water. Aug., 1926.		Collected Aug., extracted Nov. 23, 1926, at New York. Sea water unchanged and slowly evaporating to about 85 per cent. of original volume.		

TABLE I

Date	Minutes to give 1 unit of ultra-violet radiation: direct sun	Minutes to give 1 unit of ultra-violet radiation: hemisphere north sky	Foot-candles illumination: hemisphere north sky	Foot-candles illumination: 5 meters from north window	Units of ultra-violet radiation in 2 minutes direct sun	Time (hours) to give same number of units 5 meters from north window
Mar. 5	2.3	10.4	324	9.5	0.87	15.4 hours
6	1.8	9.0	391	10.0	1.10	19.4
8	2.0	9.5	372	10.0	1.00	17.7
April 2	2.3	10.1	429	9.5	0.87	19.8
13	1.4	6.2	410	9.6	1.43	19.0
18	1.9	8.0	400	10.0	1.05	16.8
May 2	1.3	5.0	477	11.5	1.54	16.0
14	1.3	5.0	620	19.0	1.54	12.5
24	1.3	5.2	763	22.0	1.54	14.0

illumination is ten foot-candles, through windows of an ultra-violet transmitting glass. The amount is so small that it is probably impossible to measure it directly, but the results of a few indirect measurements are given below.

A large room on the seventh floor with a north exposure was chosen for the measurements. By means of a Macbeth Illuminometer the foot-candles received on the window sill, from a hemisphere of north sky, were determined, and also the illumination in foot-candles at various points in the room. In March and April, when the illumination from the hemisphere of north sky was approximately four hundred foot-candles, the illumination in the center of the room, five meters from the window, was ten foot-candles. Since ordinary glass transmits 90 per cent. of the visible and an ultra-violet transmitting glass about 30 per cent. of the far ultra-violet radiation, only about 1/120th of the far ultra-violet radiation from the north sky would reach this point.

The ultra-violet radiation from the north sky and from direct sunlight was measured by a method published some years ago.[1] In the original method the rate of darkening of a light sensitive paint (lithopone) was used to measure the intensity of ultra-violet radiation. The method has been improved by substituting for lithopone a special C. P. zinc sulphide ground to a moist paste with saturated lead acetate. The paste is pressed flat under a piece of quartz and the time necessary to darken it to a certain shade is taken as the time needed to give one ZnS unit of ultra-violet energy. It is essentially similar to a photographic method, but the zinc sulphide darkens only with wavelengths shorter than 350 mμ and has its maximum sensitivity at 310 mμ.

In March it takes about two minutes to give one unit in direct sunlight at noon, with the zinc sulphide exposed in a box with blackened sides to protect it from stray radiation. At the same time north skylight, from a hemisphere of sky, gives one unit in ten minutes. If 1/120th of this north sky ultra-violet light reaches a point inside where the illumination is ten foot-candles it would take twelve hundred minutes or twenty hours to get one unit of ultra-violet radiation at that point. Or, in other words, if the room were equipped with ultra-violet transmitting windows, a child would have to sit in that place for twenty hours to get as much ultra-violet radiation as he would get in two minutes outdoors in sunlight at noon. Even this is probably too low an estimate, for it assumes that north skylight has as much ultra-violet energy in it all day long as it has at noon, which of course is not true. A table of data (Table I) obtained in this way, on perfectly clear days at noon, during March, April and May, 1928, shows that, although the intensity of ultra-violet radiation increases from March to May, it is still necessary to sit about fifteen hours at five meters from a north window of ultra-violet transmitting glass to get as much ultra-violet radiation as can be gotten in two minutes outdoors in direct sun at noon, although the illumination at this point has risen to twenty foot-candles. This amount is obviously too small to be of any great value. Any child going out for recess or any stenographer going out to lunch will get more ultra-violet radiation than she could get all day behind a window of ultra-violet transmitting glass. So, although these materials have an undoubted field of usefulness in solariums, and probably in animal houses and zoos, it is unnecessary to put them in schools and offices where it would be cheaper and more efficient to send the individuals concerned out into the sunshine for a few minutes every day at noon.

JANET H. CLARK

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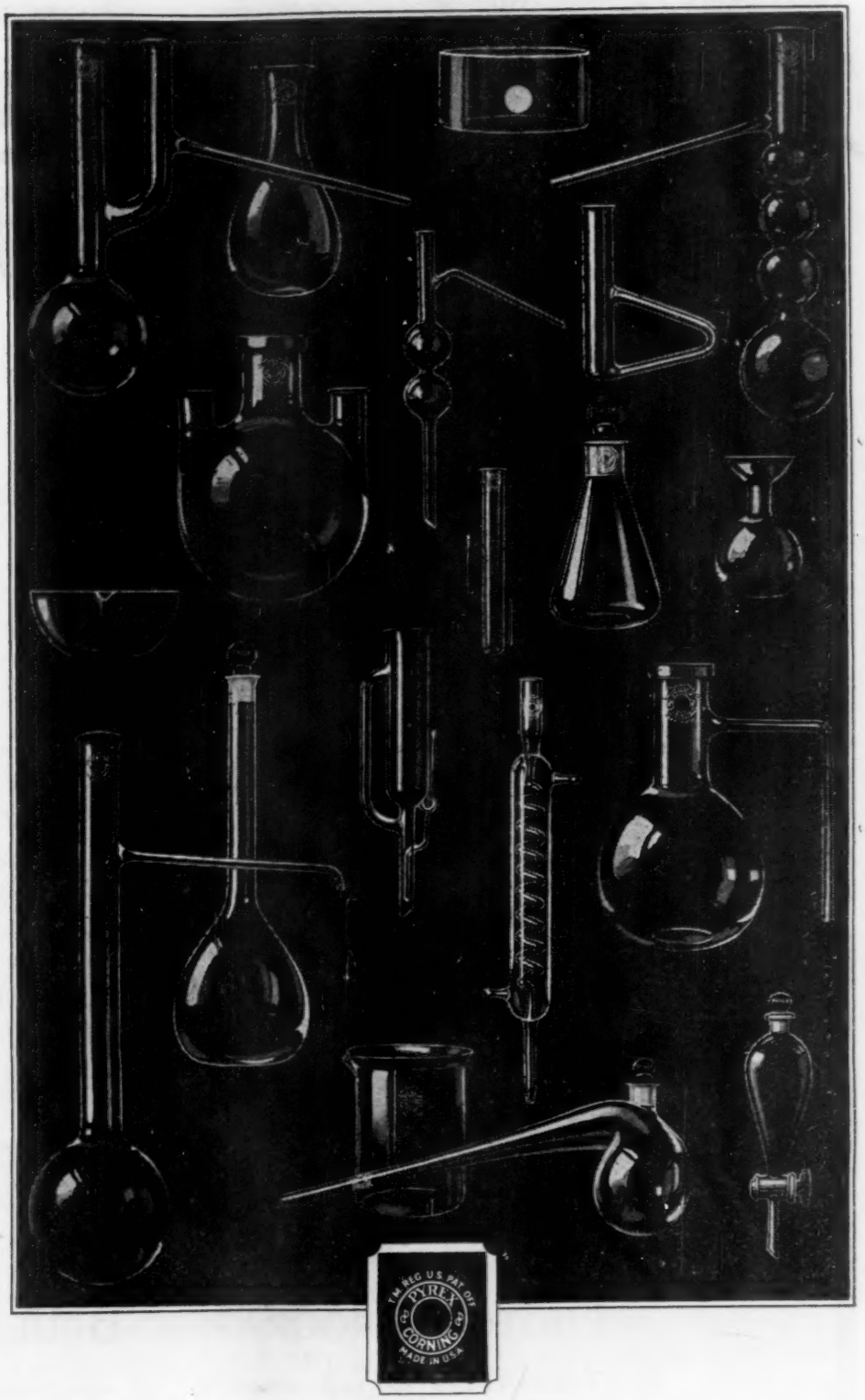
[1] *Amer. Jour. Physiol.*, Vol. lxix, p. 200, 1924.



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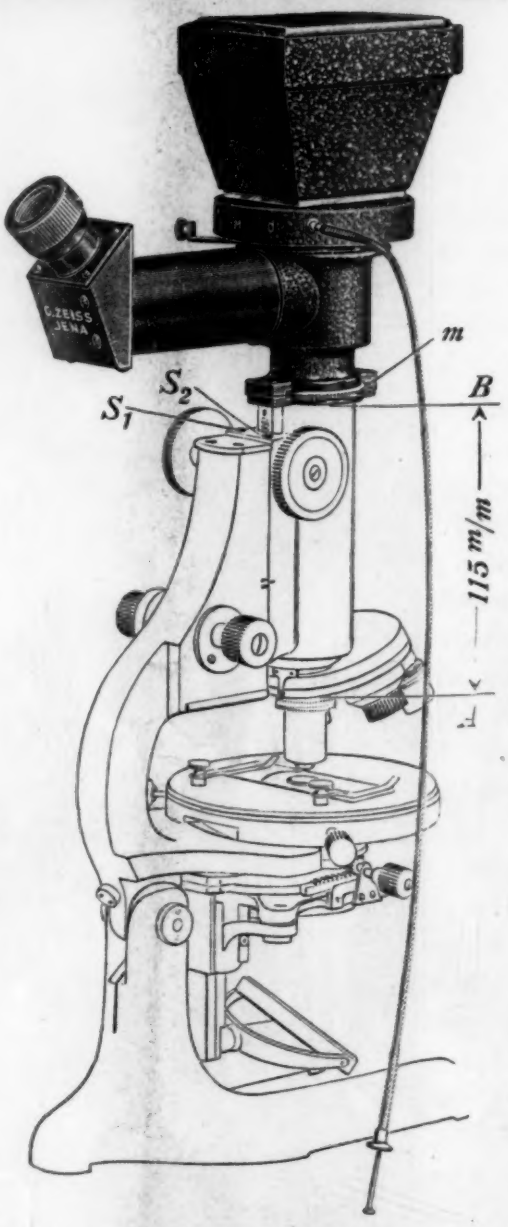

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